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The AUTOMOBILE

2,070,903 Cars in United States

Registrations for First 6 Months of 1915 Show Gain of 334,809—625,000 Car Output Predicted

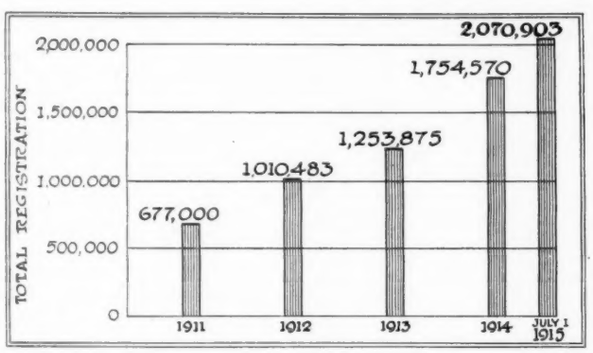
By Donald McLeod Lay

AT last the number of automobiles and motor trucks in the United States has passed the 2,000,000 mark, the total registration throughout the country at the end of the first six months of 1915 showing that 2,070,903 machines are in use between the Atlantic and Pacific and Canada and the Gulf. These statistics represent the most accurate count it is in any way possible to secure, all duplicate registrations being deducted.

334,809 Gain

This stupendous showing at first glance almost overshadows the gain of 334,809 registrations over the 1,747,234 cars and trucks in use at the end of 1914, as reported in THE AUTOMOBILE for March 25. Significant as these statistics are in the registration field, they also serve to indicate the tremendous volume of production which, contrary to many predictions, instead of decreasing, has expanded steadily so that at the present time practically all of our factories are either working night and day or up to capacity. While one concern alone has manufactured over 300,000 gasoline passenger cars, the other makers of this type of vehicle have almost all increased their outputs, while the manufacturers of electric passenger cars and those of trucks of all classes have found their factories taxed to the utmost to keep up with the growing demand.

Predictions as to the total output of these factories during the current year are found to be very conservative when they halt at a total of 625,000 cars and trucks. When one pauses to think that in addition to the 300,000 cars made by one company there are several other concerns building from 50,000 to 100,000 cars yearly, and a larger group of manufacturers who may be credited with turning out from 10,000 to 50,000 cars, it is found that 625,000 is by no means out of the question.



New York	185,767	Virginia	17,799
Ohio	152,950	Maine	16,865
Illinois	151,832	North Carolina	16,315
California	138,600	South Carolina	16,000
Pennsylvania	128,062	Rhode Island	15,000
Iowa	117,407	Kentucky	14,820
Michigan	93,669	Florida	12,493
Minnesota	82,000	West Virginia	12,000
Indiana	81,208	Alabama	11,800
Massachusetts	76,168	Montana	11,000
Texas	72,133	New Hampshire	10,422
Wisconsin	70,490	Vermont	9,489
Missouri	64,460	Dist. of Columbia	8,500
Nebraska	60,000	Mississippi	8,500
Kansas	59,485	Arkansas	7,200
New Jersey	58,179	Utah	6,615
Washington	35,000	Idaho	5,928
Connecticut	34,199	Arizona	5,426
Maryland	25,732	Delaware	4,135
Oklahoma	25,000	Louisiana	4,000
Tennessee	24,951	New Mexico	3,695
North Dakota	24,000	Wyoming	3,262
South Dakota	22,700	Nevada	1,190
Georgia	22,150		
Colorado	21,588		
Oregon	20,419	Total	2,070,903

Automobile and motor truck registrations in the various states up to July 1, allowing for duplicate registrations

A larger view of the map at the top of page 272 shows the distribution throughout the country.

Farmers Buying Cars

One of the phenomenal features apparent to anyone analyzing the registration statistics for the past two years is the gain made by the States whose populations are for the most part devoted to agriculture. These growing statistics serve to emphasize the reports to the effect that farmers throughout the country and especially throughout the grain belt of the Middle

An idea of the remarkable upward sweep of production together with the accompanying increase in car and truck registration since 1910 may be gained from the tabulation at the top of page 273. The detail figures for the individual States together with their totals are to be found in the full page table immediately below. To graphically illustrate the car population of the different States, the map at the top of page 272 shows the distribution throughout the country.

Map showing the distribution of automobiles and motor trucks throughout the different states of the country, as revealed by the statistics of the registration officials. All duplicate registrations, such as those of non-residents and those due to transfers of ownership of the same car, have been deducted

Dealers, Garages, Supply, Repair and Charging Stations in the United States, etc.

States	Dealers	Garages	Repair Shops	Supply Dealers	Charging Stations	Total
Alabama	89	75	22	12	12	155
Arizona	64	56	7	7	5	97
Arkansas	80	68	14	3	5	126
California	895	1,027	96	69	101	1,594
Colorado	188	243	20	10	24	335
Connecticut	280	313	54	21	23	506
Delaware	44	50	5	2	3	68
District of Columbia	46	46	20	12	6	111
Florida	151	149	16	2	12	235
Georgia	179	201	25	9	14	227
Idaho	69	61	1	1	5	95
Illinois	1,254	1,166	93	52	144	1,881
Indiana	646	597	68	19	67	1,007
Iowa	1,334	1,077	84	19	84	1,646
Kansas	564	565	40	12	37	934
Kentucky	169	135	7	3	14	217
Louisiana	76	55	7	3	12	104
Maine	184	196	16	4	12	299
Maryland	153	160	23	10	12	251
Massachusetts	597	704	110	62	80	1,175
Michigan	540	582	46	38	53	905
Minnesota	926	625	34	27	24	1,161
Mississippi	66	59	10	3	7	102
Missouri	618	449	100	36	40	925
Montana	157	124	13	4	9	211
Nebraska	548	430	30	11	28	705
Nevada	33	34	6	1	2	59
New Hampshire	127	152	15	3	13	213
New Jersey	432	714	48	34	53	936
New Mexico	57	49	1	1	2	82
New York	1,314	1,661	196	156	138	2,596
North Carolina	151	144	14	3	10	216
North Dakota	313	214	14	1	9	413
Ohio	979	839	92	58	110	1,479
Oklahoma	210	178	14	12	9	314
Oregon	159	165	11	17	14	253
Pennsylvania	1,062	1,138	73	110	105	1,727
Rhode Island	80	114	12	38	8	208
South Carolina	83	89	4	8	3	134
South Dakota	318	213	2	17	10	400
Tennessee	124	95	11	16	8	188
Texas	457	367	33	55	45	713
Utah	49	37	3	9	5	76
Vermont	120	112	3	13	3	181
Virginia	160	119	10	14	10	218
Washington	251	227	21	34	20	289
West Virginia	133	97	3	7	16	168
Wisconsin	683	558	15	52	50	887
Wyoming	41	33	None	6	4	59
West Indies	13	10	None	1	None	15
Canada	524	430	26	29	68	691
Mexico	9	9	None	None	2	12
Hawaii	4	5	None	None	3	5
Total	17,903	17,016	1,787	947	1,553	27,702

West, have been buying cars in constantly growing numbers and are still buying them.

Two features of the automobile and motor truck market which may be mentioned as peculiar to 1915 are the war orders for cars, trucks and tractors for the European belligerents and the continued rainy and stormy weather, which, in some sections, has had a very bad effect on the standing crops, road conditions and numerous other factors which must always be considered as influences on the automobile market.

Ohio Shows Largest Gain

Comparing the gains made in registration by the various States during the first six months of 1915, we find that the ratio of increase has been fairly uniform as compared with the registration increases during the calendar year 1914. Ohio shows the largest gain, having 32,096 additional registrations to its credit since the first of the year as compared with an increase of only 36,348 in the previous twelve months. However, it must be remembered that the bulk of the registrations are made during the first six months of the year so that it can hardly be expected that the tremendous increase will continue at its present rate, although it is practically certain that the 1914 statistics will be far surpassed. New York comes second with 25,302 more registrations than at the beginning of the year and comparing well with its gain of 37,302 in 1914. Michigan is slightly ahead of Pennsylvania with 22,085 new registrations as compared with 22,016. Michigan's gain is already larger than its total increase for the entire year 1914, while Pennsylvania's is two-thirds of its last year's figure. Illinois is credited with 19,494 additional registrations while Iowa has 18,000, Wisconsin has 16,108, Indiana has 15,708, Oklahoma 15,640 and California 15,499. Other States showing gains of 10,000 registrations or over since the first of the year are: Minnesota 14,635, Missouri 14,128 and Nebraska 10,000.

Taking up the individual standing of the States with re-

spect to the total number of cars and trucks in use, New York still leads the van with 185,767, all duplicate registrations, including non-resident registrations and cars re-registered owing to changes of ownership, etc., having been deducted from the gross total. Ohio has usurped second place with 152,950, Illinois, which formerly held it, having fallen back to third position with 151,832. California, which was third at the beginning of the year is now in fourth place with 138,600, while Pennsylvania has moved up to fifth place from sixth position at the end of 1914, having 128,062 cars and trucks. Sixth place goes to Iowa, which was formerly fifth, this State having 117,407 registrations when the duplicates are deducted. Michigan has risen from eighth to seventh place and is nearing the 100,000 mark, having 93,669, while Indiana, which was tenth, is now eighth with 81,208. Massachusetts has dropped back from seventh to ninth place which is significant of the more rapid growth of registration in some of the central and western States. The Bay State's total is imposing, however, being 76,168. Tenth place goes to Texas with 72,433, these figures being based on the count made by the Dallas Chamber of Commerce last December, no later statistics being available. Texas has thus moved up one position in the ranks; Wisconsin, with 70,490, has moved from thirteenth to eleventh position. Missouri has gained two places, rising from fourteenth to twelfth, its total being 64,460. Nebraska with 60,000, Kansas with 59,485 and New Jersey with 58,179 are the only other States with registrations of over 50,000. The standings of the States in this respect may be seen in the tabulation on page 271.

Production and Registration Since 1910

Registration	Production
1915 to July 1	
2,070,903	625,000 (Estimate)
1914	
1,754,570	515,000
1913	
1,253,875	450,000
1912	
1,010,483	378,261
1911	
677,000	209,957

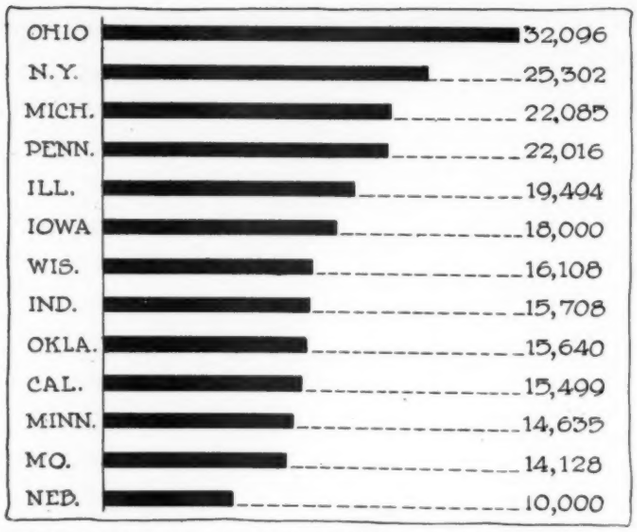
Few Systematic Records Kept

Comparatively few of the State registration officials have systematic record keeping departments which enable them to give detailed registration statistics. In other words, while they are usually able to give the total number of registrations, they have no records to show how many are gasoline passenger cars, how many electric passenger cars, how many gasoline trucks or electric trucks. A perusal of the tabulation at the bottom of this page will serve to illustrate this excellently. It will be noted that the total registration is available in practically every case whereas only a few of the States are able to give the detailed statistics, the result being that the totals are far from complete in all these cases. For example, the total number of chauffeurs in the United States of whom records are available is

Car and Truck Registration in Each State from Jan. 1, 1915, to July 1, 1915.

State or Territory	Total Registration	New Registration	Registration Up to Jan. 1, 1915	Gasoline Passenger Cars in Use	Gasoline Commercial Cars in Use	Electric Passenger Cars in Use	Electric Commercial Cars in Use	Non-Resident Registration*	Re-registered**	Chauffeurs Registered	Total Fees	Remarks
Alabama	11,800	3,300	8,500	***	***	***	***	***	***	***	***	
Arizona	5,851	811	5,040	***	***	***	***	***	425	1,390	$37,862.75	
Arkansas	7,200	1,558	5,642	***	***	***	***	***	***	***	***	
California	138,600	15,499	123,101	***	***	***	***	***	***	15,558	1,862,646.50	New law.
Colorado	21,738	3,305	18,433	***	***	***	***	150	***	***	***	
Connecticut	34,199	4,894	29,305	28,031	6,168	***	***	***	***	***	475,440.41	
Delaware	4,135	1,085	3,050	***	***	***	***	***	***	***	***	
Dist. of Col.††	8,500	500	8,000	***	***	***	***	***	***	***	***	Perennial reg.
Florida	12,493	1,127	11,366	***	***	***	***	***	***	***	***	New law.
Georgia	22,500	1,590	20,910	21,500	475	500	25	50	300	***	112,500.00	
Idaho	5,953	1,681	3,272	***	***	***	***	25	***	400	95,000.00	
Illinois	151,832	19,494	132,338	***	***	***	***	***	***	20,485	775,386.88	
Indiana	81,208	15,708	65,500	***	***	***	***	***	***	***	535,049.00	
Iowa	126,407	18,000	108,407	***	***	***	***	***	9,000	***	1,003,527.72	
Kansas	59,485	9,018	50,467	***	***	***	***	None	None	***	292,812.50	
Kentucky	14,820	3,074	11,746	***	***	***	***	***	***	3,000	98,586.27	
Louisiana	4,000	500	3,500	***	***	***	***	***	***	***	***	Local reg.
Maine	17,315	1,615	15,700	16,444	871	None	None	100	350	21,183	225,438.00	
Maryland	25,732	5,519	20,213	23,472	2,960	***	***	***	***	4,970	311,133.27	
Massachusetts	83,868	.....	87,000	***	9,900	***	***	***	7,700	17,620	999,524.90	
Michigan	98,474	22,085	76,389	***	***	***	***	***	4,805	***	305,032.00	New law.
Minnesota	82,000	14,635	67,365	***	***	***	***	***	***	***	***	Triennial reg.
Mississippi	8,500	4,606	3,894	8,000	500	***	***	***	***	***	***	Law invalid.
Missouri	66,061	14,128	51,933	***	***	***	***	None	1,601	7,762	273,718.00	
Montana	11,000	294	10,706	***	***	***	***	***	***	***	***	
Nebraska	60,000	10,000	50,000	***	***	***	***	***	***	***	***	New law.
Nevada	1,200	.....	1,487	***	***	3	**	10	None	None	3,412.53	
New Hampshire	11,322	796	10,596	10,484	938	***	***	500	400	3,782	220,000.00	
New Jersey	63,412	3,165	60,247	***	***	***	***	***	5,233	76,240	857,154.30	
New Mexico	3,770	578	3,192	3,710	50	10	None	None	75	None	29,500.00	
New York	195,268	25,302	169,966	169,575	25,693	***	***	2,177	7,324	66,921	1,642,357.00	
North Carolina	16,315	1,500	14,815	***	***	***	***	***	***	***	***	
North Dakota	24,000	6,652	17,348	***	***	***	***	***	***	***	***	
Ohio	154,600	32,096	122,504	148,702	1,486	4,322	***	150	1,500	***	874,532.23	
Oklahoma§	25,000	15,640	7,360	***	***	***	***	***	***	***	***	New law.
Oregon	20,419	4,072	16,347	***	***	***	***	***	***	3,032	91,092.00	
Pennsylvania	134,870	22,016	112,854	128,006	6,864	***	***	***	6,808	29,898	1,435,384.00	
Rhode Island	15,000	2,669	12,331	13,500	1,500	***	***	***	***	***	***	
South Carolina††	16,000	1,000	15,000	***	***	***	***	***	***	***	***	Local reg.
South Dakota	22,700	1,280	21,420	***	***	***	***	***	***	***	***	
Tennessee	24,951	5,283	19,668	***	***	***	***	***	***	***	***	
Texas§§	72,433	7,701	64,732	69,710	1,935	610	128	***	***	***	***	Loc. and per. reg.
Utah	6,615	341	6,274	***	***	***	***	***	***	***	***	Perennial reg.
Vermont	9,906	1,650	8,256	9,622	277	4	3	30	387	2,000	179,977.65	
Virginia	17,799	3,647	14,152	***	***	***	***	***	***	1,505	146,162.50	
Washington†	35,000	4,747	30,253	***	***	***	***	***	***	***	***	New law.
West Virginia	12,000	3,776	8,224	***	***	***	***	***	***	***	***	
Wisconsin	70,490	16,108	54,382	***	***	***	***	***	***	***	359,900.00	
Wyoming	3,262	834	2,428	***	***	***	***	None	None	***	16,310.00	
Total	2,120,003	334,809	1,785,613	650,846	58,927	5,449	156	3,192	45,908	275,746	$13,259,440.41	

NOTE.—3,500 steam cars, 350 steam trucks included. * Number of cars belonging to residents of other States. ** Number of cars re-registered owing to change of ownership, etc. *** Not listed separately by registration officials. †Estimated by State registration officials. ††Estimated on basis of population with reference to sectional registration. §Registration law runs from July to June. §§Statistics from Dallas Chamber of Commerce, these being only up to December, 1914. Electric cars and trucks are usually included among the gasoline machines.



Thirteen states show increases of 10,000 or over as compared with their registration statistics at the end of 1914

275,746, which, when compared with the 2,070,903 car total, is manifestly far too low.

Five States Have New Laws

Perennial registration is still the rule in the District of Columbia, Utah and Texas, Florida having left this group by the passing of a new law this summer. In Texas, registration, in addition to being perennial, is of a local character, as is the case in South Carolina. Other States which have new laws are Michigan, Nebraska, Oklahoma and Washington. Triennial registration continues to characterize Minnesota while Mississippi is still in the predicament of having its automobile law invalid.

$13,259,440.41 in Fees

As an indication of the extent to which automobile registration fees go toward supporting the State governments, etc., returns from twenty-seven of the forty-nine States show the tremendous total of $13,259,440.41 which has been paid in fees by the automobile and motor truck owners of these States during the first six months of 1915.

27,702 Dealers, Etc.

Another side of the automobile industry which reflects the rapid increase in the registration and production of cars and trucks is that occupied by the dealers, garages, repair shops, supply dealers and charging stations for electric batteries used in the cars. According to the Automobile Trade Directory, the authority in this field, there is a grand total of 27,702 of these in the United States, Canada, Mexico, Hawaii and the West Indies, all overlapping establishments being counted but once. Counting them individually, there are 17,903 dealers, 17,016 garages, 1787 repair shops, 947 supply dealers and 1553 charging stations. The distribution of these establishments among the various States and countries may be seen in the tabulation appearing on page 272.

Recent Court Decisions—Race Horse Injured

By George F. Kaiser

IN a recent Maryland case the owner of a race horse recovered damages against an automobilist, whose car had run down and injured the horse.

The horse was 5 years old, eligible for the 2.24 class; had won all amateur races in which it had been entered, and had come in second in its first professional race. While in Baltimore, being driven to the driving park, it was injured in a collision with an automobile, and when raced later in the season it was unsuccessful. The owner was allowed to show that while it had formerly been level-headed, fearless, a bold racer, and easy to handle, after the accident it was high-spirited, nervous, easily frightened, timid in racing and valueless as a race horse.

The court also held that a photograph of the horse, taken before the accident, could be used in order that the injuries might be pointed out and decided judgment for the owner against the motorist was proper upon the facts.—*Weiler vs. Weiss*, 92 *Atlantic* (*Maryland*) 1028.

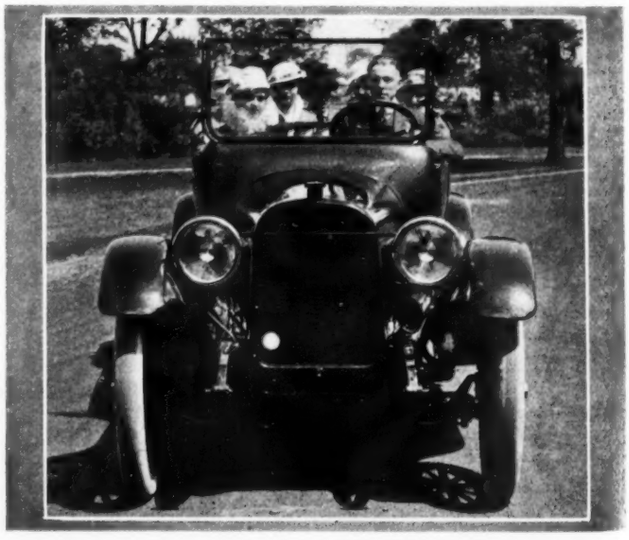
Usual Guarantee

In Kentucky a person suing for breach of warranty on an automobile sold on the "usual guaranty" must show what the usual guaranty was.

In a suit for damages for breach of warranty against a motor car company, the court decided in favor of the company. The other party contended that, the company had guaranteed and warranted the car sold to do good work, to operate well and be capable in every respect; to run over certain territory which he might have occasion to travel; and as the machine was warranted not to be defective, and be suitable to transport him and his passengers safely, but in reality it would not operate or do good work but was worthless as an automobile.

The company claimed that there was a 90-day warranty to replace defective parts, provided the machine was not repaired outside the factory.

The court held that the dealer said a 1-year guaranty on the car was not in absence of evidence of the dealer's authority as an agent, and in the face of proof that he was not an agent competent evidence to show what the usual guaranty was. The proper way to prove the usual guaranty was to call upon the company's officers or some other competent person to testify.—*Johnson vs. Co.*, 169 *S W.* (*Kentucky*) 992.



The 1916 seven-passenger Chalmers six, the chassis of which was described in THE AUTOMOBILE for July 22

Possible Troubles With Aluminum Motor

A Brief Consideration of Some Smaller Details and Their Seriousness

By A. Ludlow Clayden

SINCE writing last week on the subject of the possibilities of aluminum that have been neglected, it has been possible to obtain the opinion of one of the largest of motor manufacturers, who was also one of the first to experiment with aluminum cylinders, and the engineering opinion in this large plant seems to be capable of summation into the idea that the ultimate triumph of aluminum depends upon nothing but its price. That the aluminum motor is a better motor by virtue of its light weight and by virtue of its better conductivity to heat is undeniable, and it appears that the naturally anticipated difficulty of porosity is not a real trouble.

Suits Valve-in-Head Motor

There is no doubt, however, that the aluminum construction lends itself best to the overhead type of valve gear. In an engine with detachable cylinder heads any porosity of the bore is cared for by the cast iron liner, the head can easily be thick enough to remove all risks and both main block and head are simple castings, which again cuts the chances of porosity developing. At the same time it is reasonable to suppose that practice will make perfect in this as in all other things, and the aluminum cylinders of to-morrow ought to be better than those of to-day.

Curiously, the idea of casting the aluminum around the iron liners is not favored by either the founders or the engineer who has done most experimenting with aluminum motors. Broadly the idea is that the absolutely even thickness of the iron liner makes for freedom from distortion and that in making a composite casting it would be impossible to use a liner nearly so thin as can be done by the other method. Also it is not easy to cast the aluminum around so large a mass of iron as would be necessary.

In the machine shop the task of boring out the aluminum to receive the iron liner is a quite light one, as a rapid cut can be taken and the fitting of the liner is not difficult. Liners which have been put in cold while live steam was blown around the aluminum jacket have shown no tendency to loosen up in service and really there is no reason why they should do so as there is very little axial force transferred to the cylinder walls by the well-lubricated piston.

More dubious perhaps, is the durability of the cast iron valve seats that are cast in place as shown last week in the photograph of a block prepared for an L-head motor. It would be permissible to wonder whether the constant hammering of the valve may not loosen the iron in time, but even should it do so there are other ways of tackling the problem. For instance the valve seat and the valve stem guide might easily be a complete part, just as the cylinder liner is a complete part, and such a piece could be secured in a previously bored out seating in the aluminum.

Another point for speculation is the proper material for valve caps where an L-head design is employed. From the expansion viewpoint aluminum should be the best material and it would also have the advantage that it would carry heat away from the spark plug much better than a steel or iron cap, but it seems probable that the durability of the screw thread would be insufficiently good, considering how tightly valve caps have to be screwed in.

This last difficulty remains, whatever the material of the cap, so it looks as though the designer of an L-head job with aluminum cylinders would have to devise some novel way of securing the valve caps without using fine pitch screw threads. Of course the adoption of a detachable head does away with the difficulty, but there are many engineers who dislike to abandon the individual valve accessibility that is given by the use of valve caps.

Another thought suggested by discussing the subject, is that some engineers have kept away from the overhead camshaft type of motor because they think it cannot be made without a considerable increase of weight over the normal type. Whether this is true or not, it follows that this drawback is removed by the possibility of employing a lighter metal.

Yet another question that has arisen is the problem of fastening together the upper and lower portions of an aluminum engine with a detachable cylinder head. Often it is not too easy to find accommodation for more than the minimum essential number of studs and the softness of aluminum would call for an increase in the number so that the stress on each might be lessened. Here again the objection seems to be more imaginary than real, judging by experience as it exists at present, but a more serious possibility is that a stupid person could easily bend an aluminum cylinder head by tightening down too much on one stud before taking up the others. With a cast iron head there is danger of cracking the casting this way, but it is not so likely a happening. There may be nothing in the objection, but if there were it would seem advisable to devise some dodge which would enable the studs to be replaced by bridge pieces or clamps of some kind. Several possible ways suggest themselves but the chances are that they need not be considered unless practice proves the contrary to be the case.

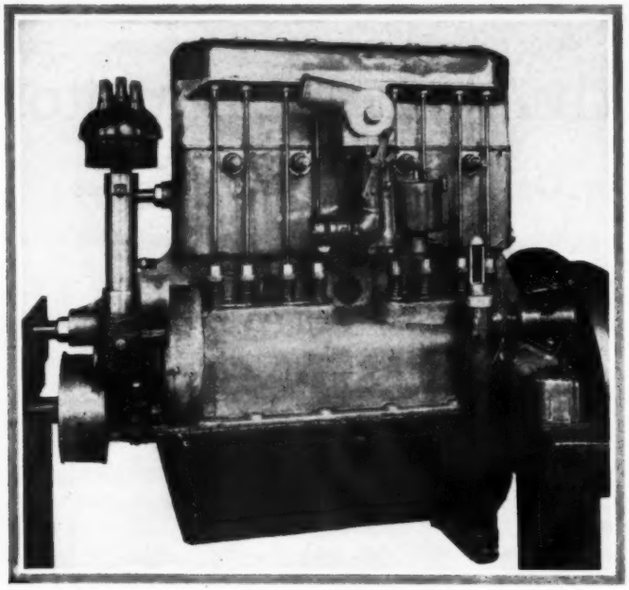
Some Useful Data

A point which will arise naturally in the mind of an engineer when first he thinks of using aluminum cylinders is that the co-efficient of expansion for aluminum is greater than that for cast iron. Examining the actual figures for a moment, the co-efficient of expansion for aluminum is 0.000023. Assuming that the motor operates between the temperatures of 32 and 212 deg. F., which is an over statement, the expansion per foot would be 0.0023 ft. or just under 28 thousandths inch. If the distance between the cylinder bore centers is 6 in. the maximum displacement on a large six-cylinder motor would not exceed 30 thousandths at most, as the range of temperature over which a motor operates is much smaller than from 32 to 212 deg. F. Per cylinder the amount of axial displacement would therefore be about 4 to 5 thousandths which the normal end play on a connecting rod bearing exceeds very greatly.

Another point is the amount which must be allowed for shrinkage in casting, this being 5/32 in. per foot as against ⅛ in. for cast iron, not by any means a serious matter.

Prefers Steel to Aluminum

PORT JEFFERSON, L. I., N. Y.—Editor THE AUTOMOBILE:—The question of aluminum and its uses in the make up of the modern automobile as outlined by A. L.



Another view of the Sterling aluminum motor illustrated and described in THE AUTOMOBILE for Aug. 5

Clayden in THE AUTOMOBILE, Aug. 5 issue, will no doubt open up a discussion which should establish something of value in reference to this material and its general use.

My experience conflicts with his conclusions and recommendations in a great many ways. I am not forgetful, however, of the fact that we may consider the results to be obtained from several different angles which would more or less influence the obtainable results to be had by the use of aluminum. In explanation of this statement in the case of a low-priced automobile with a comparatively low range of efficiency required the generous use of aluminum would without doubt result in a material gain in efficiency both in up keep and roadability, but to produce increased efficiency by reducing weight and increasing the power output disregarding the gains as a result of weight reduction aluminum would be the last metal used.

In the first instance it would mean the easing up of work required and from a predetermined unit with given capacities it would result in a net improvement, but in the latter case the object would be to refine the power plant bringing it up to a higher standard in an endeavor to generate more power with a smaller unit. This would mean increased ability demanding higher stresses and higher thermal efficiency. Carrying this theory to a point within practical limits would result in reducing the power demanded, which together with the increased ability would result in a net gain many times greater than an attempt to lessen the weight through the use of aluminum under the same conditions as mild steel and cast iron are now used.

Difference in Expansion

Assuming that one adopts the second plan I do not believe the use of aluminum would be permissible in any of the vital parts about the motor. The first great handicap is the vast difference in expansion between this metal and any of the stronger steels or even cast iron, which means that the use of liners or inserts is practically prohibited, and still further considering the fact that while aluminum is only about one third lighter than steel its strength is less than one-sixth as great as that of modern steel, the result being that most any part of a motor or car can be made lighter by the use of steel. My impression is that if two engineers of equal ability were given free hand to design an automobile of a given capacity one to be confined to the use of steels and the other to the use of aluminum, cast iron and mild steel, that the former would win out by a large margin so far as ability and lightness are concerned.

Referring to the Sterling motor used in the article as a criterion of the use of aluminum I would doubt very much the ability of this motor to withstand being brought up to a high efficiency for any length of time. The insertion of a cast iron sleeve for the cylinders would to my mind destroy any gain to be derived from the conductivity of aluminum so far as dissipating internal heats is concerned inasmuch as the joint would prove a non-conductor to a far greater extent than the aluminum would improve the conductivity.

There appears only one possible condition that might make this type of construction possible and that is that owing to this joint the inner sleeve would work under a much higher temperature than the outer walls, which might overcome the great difference in the co-efficient of expansion between the two metals, but even should this assumption prove to be a fact we are still up against the tremendous range of temperatures that exist in the operation of a modern automobile, and whether or not these could be compensated for by prolonged experiments is a question.

Redesign to Reduce Weight

Since the total weight of this motor is not given it would be quite hard to give an estimate of what could be saved in design, but it does not follow the best design for lightness, and my impression is that the motor could be re-designed and be made lighter by using iron and steel throughout than it is as shown with the use of aluminum, and there is no doubt but what its power output could be increased per pound weight considerably, and after all this is the unit of measure that must be considered.

The use of aluminum and aluminum alloys for pistons is certainly a mistake so far as my experiments have led me to believe. That they can be made at less cost than a steel piston or cast iron of equal weight is a fact, but when it comes to the question of weight, disregarding cost, the steel is far ahead of aluminum. Besides with the steel piston a much higher thermal efficiency can be had than with the use of aluminum. In the case of the Sterling motor if the aluminum cylinders are lined with cast iron the conductivity of the aluminum piston loses its value to a great extent and my impression is that a very low compression ratio would have to be used in order to keep from melting the pistons.

The use of aluminum to any great extent for important chassis parts has also received a setback in my estimation as a result of my later experiments along this line. I am thoroughly convinced that road shocks run much higher at times than any of us estimate. My conclusions along these lines are brought about by the use of aluminum in chassis parts. Inasmuch as failures appear at long intervals apparently not consistent with fatigue or ordinary use while none of the steel parts as used in my last two years of experiments have shown a sign of failure, so that by using aluminum I believe a factor of safety of twenty to one would have to be adhered to. This would mean that the weight of your parts would be far in excess of steel under the same conditions when you use a factor of safety of ten to one figuring from the elastic limit of steel rather than its ultimate strength. A more convincing argument can be had when confined to some specific case, a result which we hope will be had if the subject can be kept alive in the columns of your paper. —Finley Robertson Porter Co., Inc.

Aluminum Too Porous

DETROIT, Editor THE AUTOMOBILE:—Relative to the use of aluminum castings for cylinders, for motorcars, permit me to call to your attention that in 1906 the Oldsmobile Co. used a water pump on the forward end of the crankcase. This pump was of the key type, the body of the pump being machined

directly out of the aluminum crankcase. In certain sections of this country the water was of such a character that it rapidly ate through the aluminum and permitted leakage of the inside of the crankcase. This was so serious that the Olds company had to make a change in design and incorporate a pump as a unit, bolted to the face of the crankcase.

I would hesitate very much about attempting to repeat this performance, in running water directly through the aluminum. I realize that there are a number of intake manifolds, waterjackets, and there is evidently no trouble in the use of aluminum for this purpose. However, my direct knowledge of the subject is of a very limited nature, and I would hesitate to make any claims that the water used in the various parts of the country would not ultimately eat through the aluminum and destroy the casting. Of course, an owner could be instructed to use distilled or rain water in the cooling system, but this is imposing a hardship that is fully as disagreeable as instructing the owner to use distilled water in the battery once a week. This is one of the hardest problems we have had to combat since the incorporation of the electrical starting and lighting system on the modern automobile.—C. C. Hinkley, engineer Chalmers Motor Co.

History of Aluminum

PHILADELPHIA, PA.—Editor THE AUTOMOBILE:—My recent experiences have not included the pistons that I feel sure ought to be of aluminum. I early foresaw the value of this light metal and knew something of the cycle frames cast in one piece that were stronger than steel ones. I began using aluminum in 1896 and that winter tried cylinder heads and waterjackets of it. Early in 1897 I tried a few pistons as large as 6 in. diameter in a water-cooled job and some small ones in a motorcycle engine. Also used it for rear-axle housings. The results were bad. The metal was found to be very porous. It was clear the founders did not know how to handle it. Gas could be heard bubbling through it.

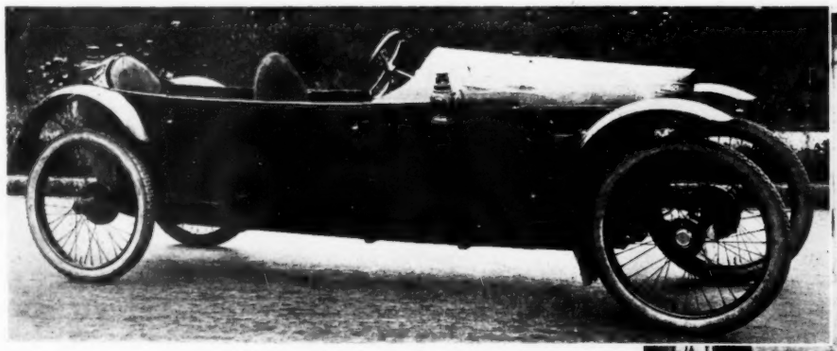
The rear housing did not show much strength at the heavy end where it should have been strongest and was perfection at the light end where it first cooled. The motorcycle pistons did better but fearing to take the chances they were all abandoned. But I still remembered the cycle frames. They were cast in iron molds and before pouring the molds were heated above the melting point of the alloy. After pouring they were cooled by a spray beginning at the bottom. This allowed the molten metal to flow to the cooling portion and fill up the shrinkage which ordinarily tears a casting to pieces. Surprising strength was gained by this process but the molds did not last long. With better steels to-day this should not bother. It certainly has a big future.—Charles E. Duryea.

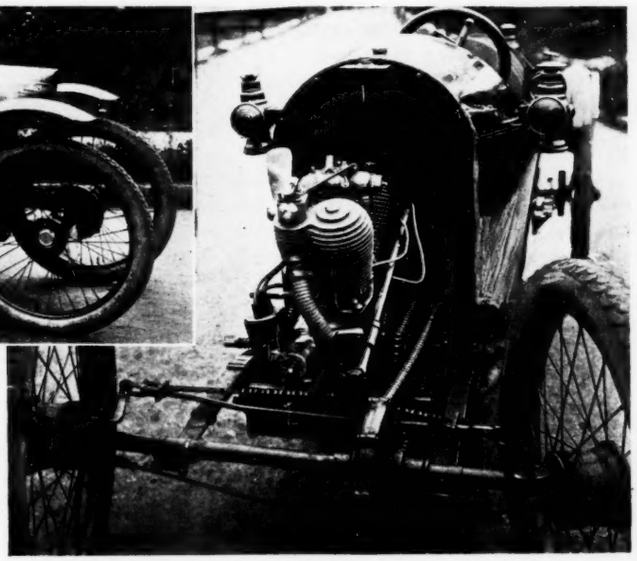
Likes Aluminum Parts

SANDY HOOK, CONN.—Editor THE AUTOMOBILE:—I notice in the current issue an article on the lightening of motor car parts and therein a reference to the adoption of aluminum alloy connecting-rods, I might say that I installed magnalium rods in my car, model O, Knox, over a year ago, these rods have run close to 6000 miles without any attention whatever and in connection with the change to magnalium pistons reduced the weight of the reciprocating parts 27½ lb. I consider this a very pronounced reduction and to get a further idea as to the possibilities of the metal have designed a piston for this motor, 4⅞ in. bore, that figures 11⅝ oz.

I am regularly turning out Ford pistons that weigh 13 oz. and have installed alloy pistons in quite a number of other makes of cars with very satisfactory results. The magnalium pistons in my car were installed three years ago and have run nearly 20,000 miles.—A. C. Griscom.

Morse Cycle Car Has Front Drive

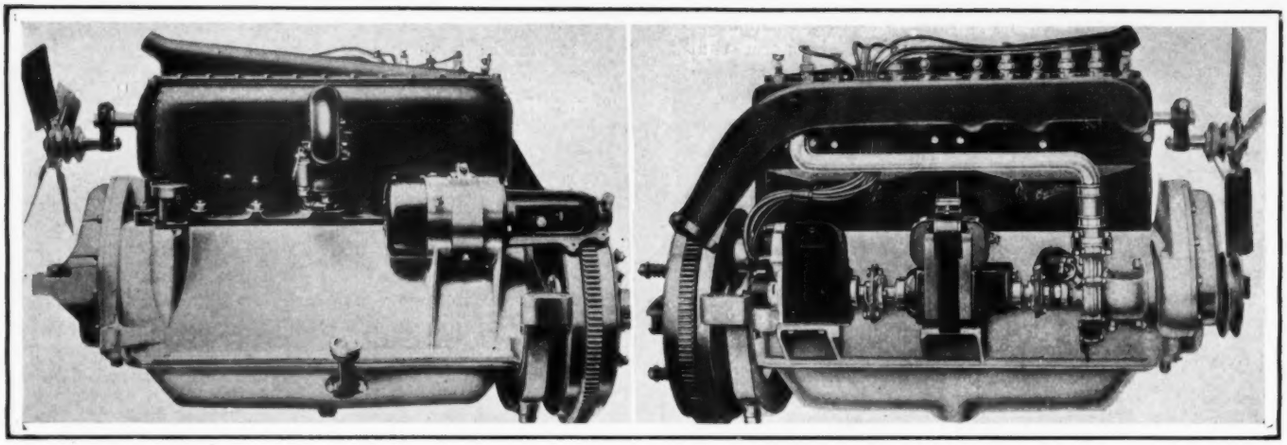




FOR those who believe in the cyclecar, the product of the Morse company, Pittsburgh, Pa., which has just announced a car of this type with tandem seating, narrow tread, and two-cylinder V-type engine, will be of interest. The car is shown in the accompanying illustrations and is said to weigh but 600 lb. It is featured by a front drive, so arranged that the power plant is assembled as a unit in front, the drive being transmitted to the front axle by chain, the efficiency for which is claimed to be 95 per cent.

A claim of 40 to 50 miles per gal. of gasoline is made and it is stated that it is possible to travel from 50 to 60 m.p.h., while owing to the low center of gravity, the tendency to overturn is very slight. The hill-climbing ability of the car is claimed to be very good and according to the showing made at the recent contest at Uniontown, where the little car secured sixth place in the event for cars up to 230 cu. in.

The change-speed mechanism provides two speeds forward and one reverse. The brakes are 8 by 1⅜ in. mounted on the rear wheels and lined with Raybestos and there is also a brake on the transmission communicating to the front wheels. The equipment includes an Atwater Kent system for ignition, Schebler carbureter, a full set of lamps for the side and tail, with a top, gas tank and gas headlamp at $30 extra. The price of the car is $350 with standard equipment, and it is mounted on a 105-in. wheelbase, with 28 by 3-in. tires, and is provided with a two-passenger tandem-seated body.



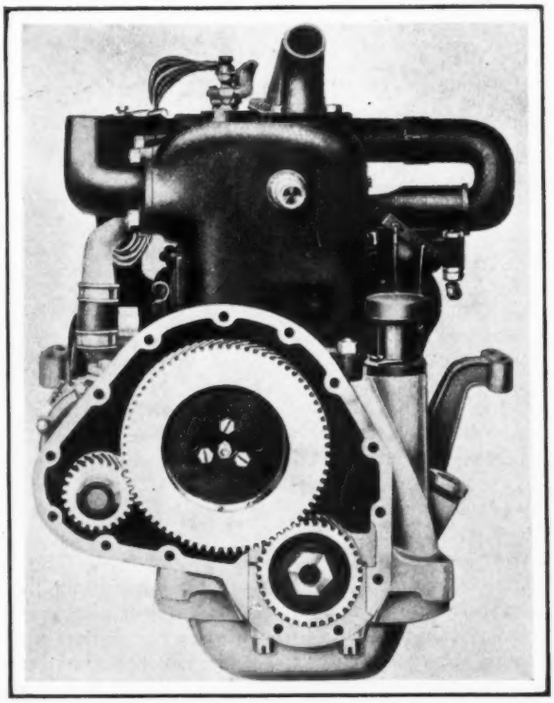
Left—Shows high mounting of starter and carbureter. Right—Gives a good idea of the valve accessibility. The oil pump can be seen just above the coupling between the water pump and generator

Overland Brings Out New Six

Chassis Is Similar to 1915 Model—Motor Improved in Detail—New Design Body Has Straighter Lines

At present the Overland plant at Toledo is producing completely one type of car only, the four-cylinder model with poppet valve motor. The Knight motors for the Willys-Knight come from Elyria and the sixes from Detroit, so the assembling shops and the test shop at Toledo are not interfered with by the necessity for handling more than one model of engine. In the chassis assembly the frame designs are changed a little so as to suit the different motors and the effect is that the assembly operations differ very little indeed whether the chassis has the standard four, the Knight or the six. This system makes for efficiency to a marked degree and means that the three models can be produced with extremely little special organization in the main factory.

Though not made in very large quantities as quantities are reckoned by the Willys-Overland Co., the Overland six is none the less a popular car. This year some 7000 or so are scheduled, and the car would certainly sell readily in larger quantity as the price, $1,145, is quite low as compared with the style and finish. The main characteristics are a smooth acting motor, with ample power and excellent acceleration, a large and very comfortable body, particularly good springs and conspicuous accessibility. In running it is very quiet even after covering a distance equivalent to more than an average year's use, the model car, which has been run over 12,000 miles by the factory testing staff, being altogether devoid of small rattles or squeaks, either from the chassis or from the body. Considering the harsh way in which factory test cars are usually treated, this speaks very well of the body framing in particular, as an old body without a door rattle is far from a common thing to meet.



Front end of motor showing new timing gears, oil filler and horizontal carbureter with hot air supply taken through cylinder block

Several Changes in Motor

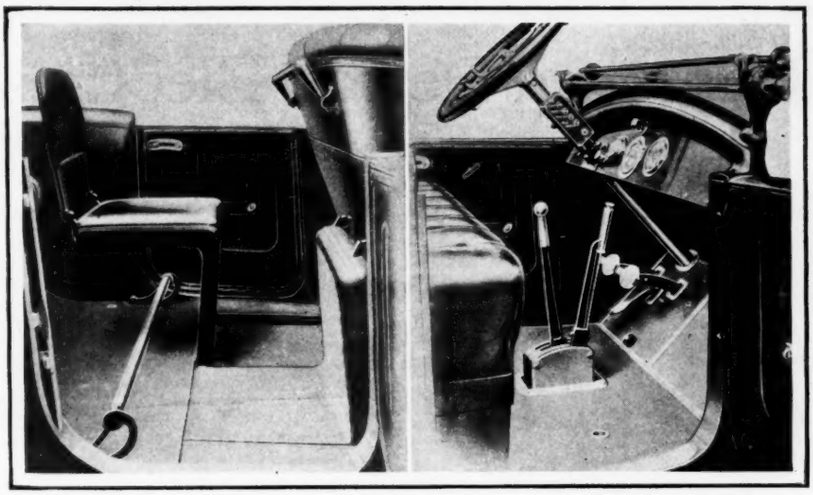
The 1916 motor is considerably different from the 1915 six, having helical gears for timing drive instead of the spiral gear arrangement used previously. By this change some weight has been cut out and the engine rendered much neater and more accessible. With an S. A. E. rating of 29.4 the motor dimensions are 3.5 by 5.25 in., giving a piston displacement of 303 cu. in. The maker's rating is 45 hp. and this the motor should be easily capable of developing, as it will run at high crankshaft speeds.

Regarding the valve side of the motor, it will be seen that the generator and magneto are driven in tandem from the water pump shaft, and that all three accessories are placed low enough to clear the valves of obstruction. It should be added that the accessibility is actually better than it appears even, as the generator stands well away from the side of the crankcase, giving room for the manipulation of a tappet adjusting spanner. The use of leather disk couplings between pump and generator and between generator and magneto entirely prevents noise in the drive and also eliminates the possibility of slack arising, which is important in a tandem drive, for any lost motion between the front

end pinion and the magneto would necessarily affect the timing of the ignition.

In the valve side view of the engine the large exhaust pipe is noticeable. This has a vertical division inside, extending from about the middle of the length right back to a point just above where the exhaust pipe is attached. The purpose of this division is to separate the discharge from the three front cylinders so that exhaust strokes take place on alternate sides of the division, the idea being to prevent interference which might create back pressure.

The reverse side of the motor bears the carbureter and the starting motor, the former being a special form of horizontal instrument attached directly to the cylinder block where it is extremely accessible. All the air for the carbureter is drawn right through the cylinder casting, entering at a hole concealed by the exhaust manifold and reaching the carbureter by the curved pipe seen in the reproduction.



Left—Type of folding seat used in Overland Six. Right—Every detail of the control grouped for the driver's best convenience

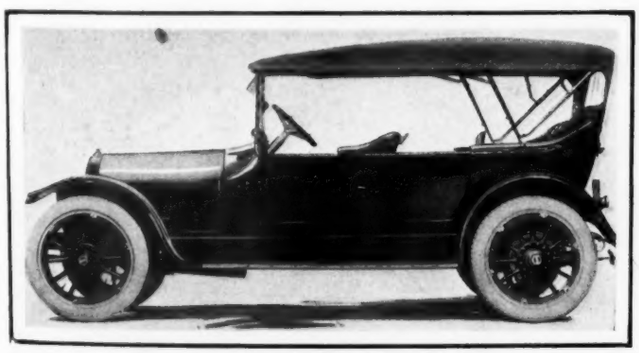
It should be noticed that the starting motor is placed high up, where it is out of the way of dirt and the Bendix drive is accessible for the occasional lubrication which it needs. On this side of the motor also are the oil filling cap and the level indicator, so all the ordinary needs of the motor can be attended to by raising only one side of the hood.

Lubrication is a combination of force and splash, a plunger pump operated from the camshaft sending high pressure to the main crankshaft bearings, the pump shaft bearing and the timing gears. Troughs catch the overflow and dippers on the connecting-rod caps distribute spray to all parts of the motor. A large diameter shaft and very rigidly supported bearings eliminate vibrations with a remarkable degree of success.

Clutch Has Multiple Springs

An aluminum cone with a leather facing is used for the clutch, but there are three springs instead of the more usual one. Spaced equally around the clutch cone these light springs are ideally accessible for adjustment and there is no need for the exercise of any very special precaution to see that all are at the same tension, since inequalities are compensated for by a floating spider inside the flywheel. Cushion springs beneath the leather are used to ease the engagement, which is very smooth and soft. A special point is made of the light pedal pressure required which is available for drivers of any stature by virtue of the adjustable pedal plates.

Though the after part of the chassis is similar in appearance to the well known Overland four, the rear axle is strengthened in proportion to the heavier stresses it has to bear. It is a floating type with the road wheels mounted upon double rows of Timken taper roller bearings. For the differential the four-pinion bevel pattern is used and there are large Timken bearings to support both it and the crown wheel. The driving shafts can be withdrawn through the hubs, and the axle case is strengthened by the use of truss rods.



The 1916 Overland Six has a handsome body with perfectly straight lines and wide, domed fenders

Located on the rear axle is the three-speed ball bearing transmission, and there is a torque tube containing the propeller shaft, in accordance with Overland practice. The single universal is located well forward in the chassis where it is completely protected and easy of access for lubricating purposes. Quite a feature of the car are the large brakes which provide great arresting power with smoothness of action, the service brake in particular having a wonderful grip with quite light pedal pressure. Ample width of drum and plenty of surface for both the external and the expanding bands is the secret, combined with direct pull rods and no lost motion or heavy pull-off springs.

Convenience of Control

A point in the design which has had special study is the location of the controls which the driver requires. Thus the accelerator pedal is situated in the natural resting place for the right foot, the right hand rests easily upon either the gear or emergency brake levers and the lamp and ignition switches are all together in a little control box clipped to the steering column. The speedometer dial is central in the cowl board, flanked by the ammeter and the oil pressure gage, all being illuminated by a dash light which is always burning when the headlights are in use with or without the dimmer. It may be added that all the switches can be locked by a turn of a key at the bottom of the control box, so preventing interference with any circuit. For operating the starter there is a toe button, as the Bendix drive needs only a switch action for its complete operation.

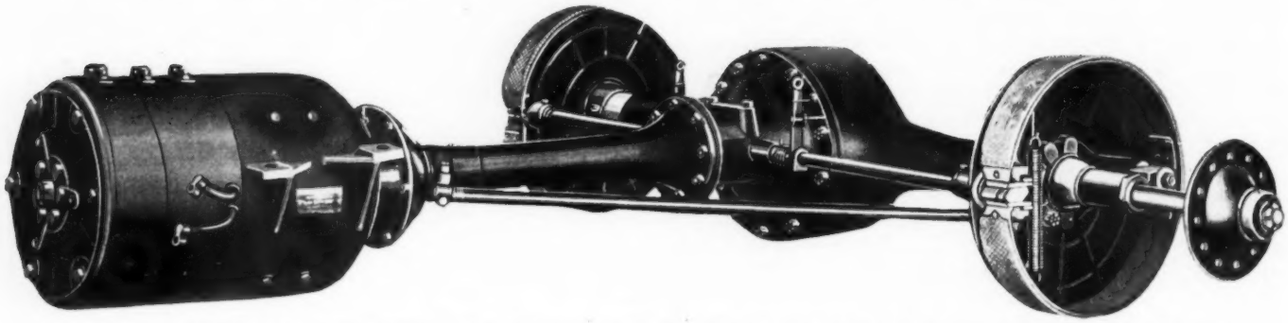
Plenty of Room in Tonneau

It is said that the springs are especially good and their easy action is aided by an ample depth of upholstery, but the long, three-quarter rear springs do not create much roll when rounding a curve at high speed, and it is also noticeable that the rebound is slight. For this reason it is possible to sit back comfortably on a rough road and make use of the leg room.

The standard equipment includes all the usual accessories and a spare demountable rim, tires being 35 by 4½, with nonskid treads on the rear.

Improved Detroit Electrics Lower in Price

Spiral Bevel Drive Optional—High Quality Chassis and Bodies



Power unit showing direct drive connection between motor and worm bevel drive. Note large expanding brakes in hubs

WHAT might be regarded as a new phase in electric car manufacture begins this week with the announcement of sweeping reductions in the prices of all of the models of Detroit electrics, made by the Anderson Electric Car Co., Detroit, Mich., the activities of which in its field are a good indication of the trend of this branch of the industry.

The Detroits are to sell at prices ranging from $1,975 to $2,275, which means reductions running from $600 to $725, depending upon the model. Along with this significant move, Anderson makes the statement that production is to be practically doubled for the coming year, this being the main reason for the large price cuts, as the cars are quite evidently not cheapened in any way. They are, as a matter of fact, more highly refined than ever.

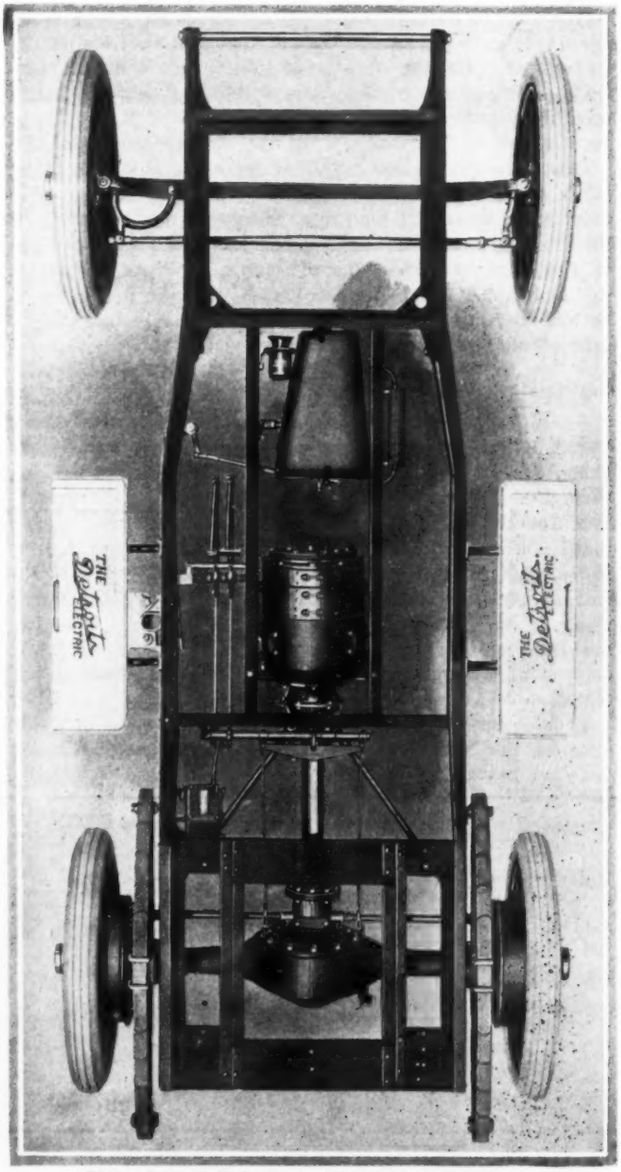
As an indication of the standardization that is going on with the Anderson company, it has adopted a one-chassis basis of production, with five different types of bodies fitted thereto. This is a noteworthy situation from a manufacturing standpoint.

The 1916 Detroits comprise six models. Briefly, these are model 61, which has been reduced from $2,600 to $1,975, and is a four-passenger brougham; model 60, a five-passenger double-drive brougham which formerly sold for $3,000 and is now $2,275; a rear-drive five-passenger brougham, model 59, which has been cut from $2,950 to $2,225; model 58, formerly $2,950 and now listing at $2,250, also a five-passenger brougham, but having front drive; a four-passenger inclosed type, known as model 57, which formerly cost $2,850 and is now $2,175; and model 56, which is a popular cabriolet style for three-passengers and sells at $2,075, as compared with its old price of $2,650. There is nothing changed in the basic construction of these cars, as they continue to use a 4-hp. series wound motor with shaft drive to the rear axle, and 42-cell lead battery equipment.

Optional equipment is given for the rear axle, for beside the standard type of worm drive used in the 1915 models there is being offered a floating spiral-bevel gear rear axle with a reduction of 6 to 1. Ball bearings are used in the construction, and the differential gears are cut from chrome-nickel steel.

Refinements Numerous

There are, however, a number of refinements worthy of notice, all tending towards greater interchangeability of parts throughout the line of bodies, and to even better body work, performance and convenience. For instance, the glass



Plan view of Detroit electric chassis for 1916

in the bodies is mounted on thick rubber, with the channel dovetailed in such a manner that it is said to be impossible for wash water or the most driving kind of rain to find its way within the body. Door locks have been fitted which may be operated from either side of the car, both from the inside or the outside, this having an obvious advantage.

Cut-Out Design Improved

The current cut-out has been entirely redesigned in order to adopt the more efficient knife blade type of switch and this new design has proved itself most reliable after much testing. The top cover of the cut-out box is easily removable for inspection purposes and, as another indication of accessibility, taking out two screws allows the removal of the bottom of the box, to which the contacts are fastened. This makes it simple to inspect or work on the contacts.

The third speed shunt has also been made of greater capacity, by using a larger diameter of wire. This acts principally to increase the rate of travel on third speed and it really makes a better speed range for, with the new wiring, the third speed is exactly half the difference between the second and fourth speeds, measured in miles per hour.

All the bearings in the controller have been made of the self-lubricating type, and another controller change is a new design of cover and the use of a pressing for that member. The resistance for the adjustment of the motor brake, together with the meter shunt, has been mounted on the controller base and underneath the cover. A piece of felt running the length of the controller frame and saturated with sperm oil provides for automatic lubrication of the controller drum so that the drum contacts wipe across the felt which keeps the controller blade constantly clean and lubricated. Leakage of the current is prevented through the oiled felt by now mounting the lubricator in a separate casing insulated from the controller base.

No change in principle has been made in the motor brake. Refinement details however include the use of a Raybestos covered disk mounted upon a screw thread, which allows adjustment for wear. This dispenses with the twelve or fourteen adjusting washers which were used on the previous models of motor brakes. Improvements have also been made by the addition of more brake material, which allows a greater degree of wear without the need for frequent adjustment.

Brakes on rear hubs are of the internal expanding type, size 2½ by 16 inches, and are operated by merely pushing foot brake pedal forward. To the left of foot brake pedal is located a smaller pedal. Pushing this small pedal forward with the foot applies rear hub brakes and simultaneously cuts off the power through a knife blade cut-out switch. It also operates ratchet which sets brakes. When brakes are set in this manner they cannot be again released until controller handle is in neutral driving position.

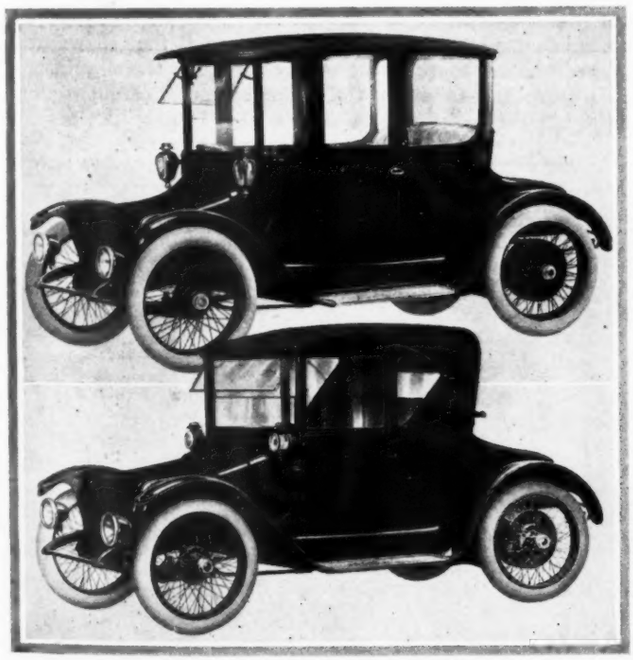
A new design has been worked out for the first speed resistance. The resistance coil of heavy wire is supported on the frame at each end, so that there is a circulation of air all around it. This increases the heat radiation, and affords a considerable saving in weight.

Refinements have also been built into the controller mast and its universal joints, the latter now being of heavier construction than it was, with an adjustment provided for wear. A bar of spring steel is used to connect the joints so that there will be a slight yielding in case an inexperienced driver should apply the motor brake too harshly. The steel, however, is stiff enough to be rigid under all ordinary driving conditions. This construction is to safeguard the bending or disarrangement of any of the other parts of the controller mechanism.

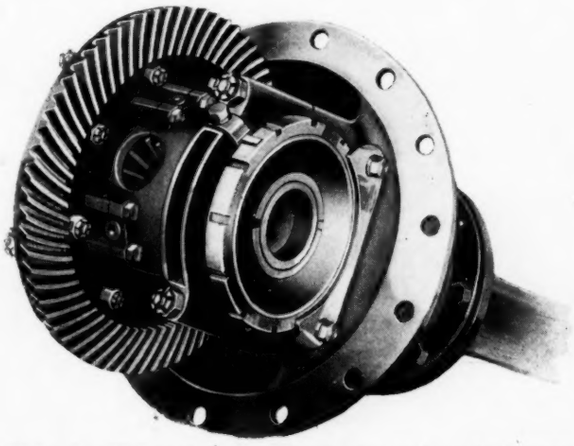
Battery equipment consists of 42 lead plate cells of 15 plates each, and is contained in eight trays arranged lengthwise of the car. This method of arranging them allows for identical trays, and very accessible connections upon raising the battery hoods. Weight reduction of about 50 lb. has been accomplished in the battery construction.

Wide Choice of Body Styles

Enumerating some of the special features of the several body types, the Anderson company calls special attention to the fact that model 61 is especially applicable for city driving, due to its compactness and the ease of handling in traffic. The operating levers are mounted on the left of the rear seat, and steering is accomplished by the driver's right hand, while the shorter lever does the controlling. Theft of the car is prevented by a nice feature whereby the levers can be swung upward into a vertical position and locked against operation. Three persons can be accommodated on the wide rear seat, and a fourth passenger is taken care of by a revolving Pullman-type of chair in the front right corner. Wire wheels or wood type are optional, as are also Goodrich silvertown cord tires of 34 by 4½ size, or Motz cushion tires. Wheelbase of all models is 100 in.



Above—Model 57 four-passenger Detroit electric rear drive brougham which sells for $2,175. Below—Model 56 three-passenger cabriolet which is listed at $2,075



Details of spiral bevel worm floating rear axle which is optional on the new Detroit electrics. This has a reduction of from 6 to 1 and ball bearings are used in its construction

New Commerce Delivery

Strength and Sound Design Features of Chassis—Every Detail Made for the Job

IT is an accepted maxim that the best sort of vehicle to use for the transportation of goods is one built for the purpose and not one adapted to suit it. While many converted pleasure chassis do give good service as delivery cars it stands to reason that a type with twice the strength cannot fail to give more enduring service.

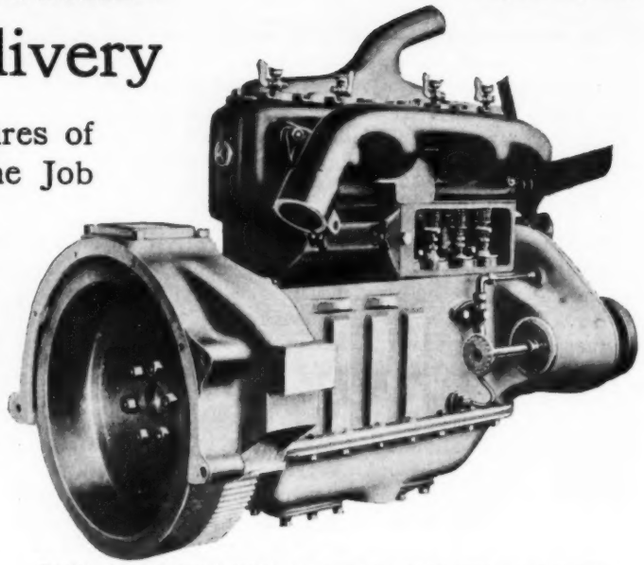
It is with this idea that the Commerce chassis has been built, but with the additional thought that the retail storekeeper or dealer does not want to pay a high price, in fact a high first cost may easily make it impossible for a car to be used where it would be truly valuable.

Good Units in Assembly

The Commerce Motor Car Co., Detroit, Mich., has picked good units such as a Continental 3 by 5 in. motor. Gearing and clutch come from the Detroit Gear & Axle plant, being just as much intended for rough handling as is the truck motor, while the bevel driven rear axle is a special construction calculated to carry a big overload. The rated capacity of the car is 1,500 lb. and plenty of space is allowed, as instance the dimensions of the floor of the panel van which is 88 in. long and 44 in. wide. As to the frame, this is good stout steel and the section 4⅜ in. deep by 3½ in. wide, these dimensions being maintained for nearly the full length and the amount of tapering off confined to the front end which has only the engine to carry.

Thoroughness and simplicity are the keynotes of the whole machine the driver having as little as possible to care for. Thus the motor is cooled by thermo-syphon, the special design of radiator and the amply large pipes making this system perfectly satisfactory and eliminating the water pump which always needs some attention. For lubrication a sight feed is introduced in the feed line from the oil pump and all the oil for the rear crankshaft bearing passes before the eyes of the driver.

Brakes, which of course, need adjustment from time to time have settings at three points, so that their efficiency can be maintained at the full till the last scrap of lining is used up. On the bands themselves there is a setting to keep the last lever in the position of best pulling power. Then there is an adjustment on the clevis of each pull rod which cares for the countershaft lever positions, and lastly there is an adjustment at the front end which cares for small degrees of wear and can be got to with the utmost ease.



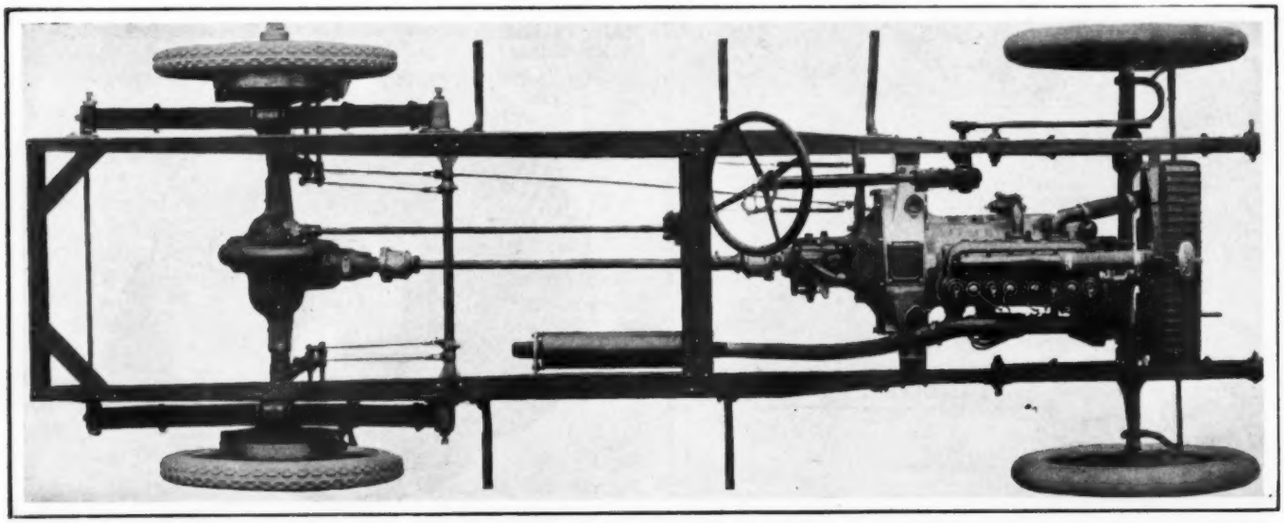
Right side of Continental 3 by 5 in. motor used in the new Commerce delivery car

Motor Is Rugged Job

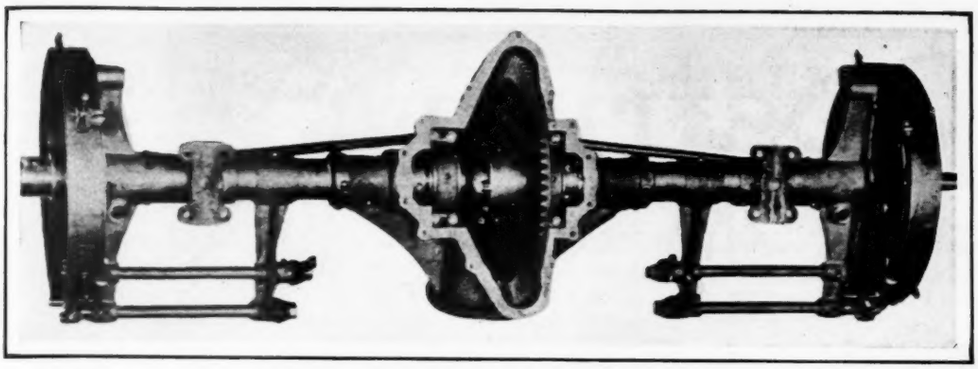
There is no need to say much about the motor save that it embodies all the best Continental practice. The four cylinders are in block and the valves are individually accessible through brass valve cups which makes grinding in a somewhat quicker job than when the whole cylinder head has to come off. On the right side the Eisemann magneto is situated and is low enough not to obscure the valve springs which are inclosed behind pressed steel cover plates. On the left side there is nothing but the Breeze carbureter and the oil filler.

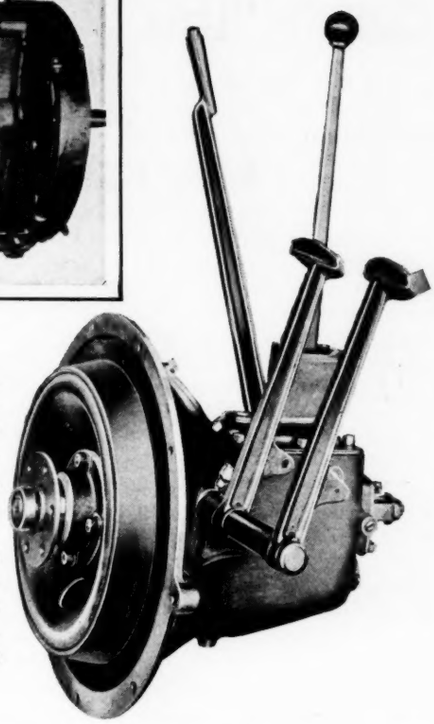
There are three large crankshaft bearings to which oil is fed under pressure from the plunger pump that is operated off the camshaft, dip troughs catching the overflow and caring for the connecting rod lubrication. A separate feed supplies the helical front end gearing. On the left side just alongside the oil filler is a gage with a dial that shows at a glance whether there be the proper supply in the oil pan.

In order to save weight the engine has an aluminum crankcase, but the gearset is housed in cast iron as the case is



Plan view of Commerce delivery car chassis, showing the strong construction of the assembled units and three-point suspension of the power plant





Upper left—Showing the strong construction of the rear axle used in Commerce delivery cars. Note the large braking surface

Right—Clutch and control lever assembly on the new Commerce. Note compactness of the unit

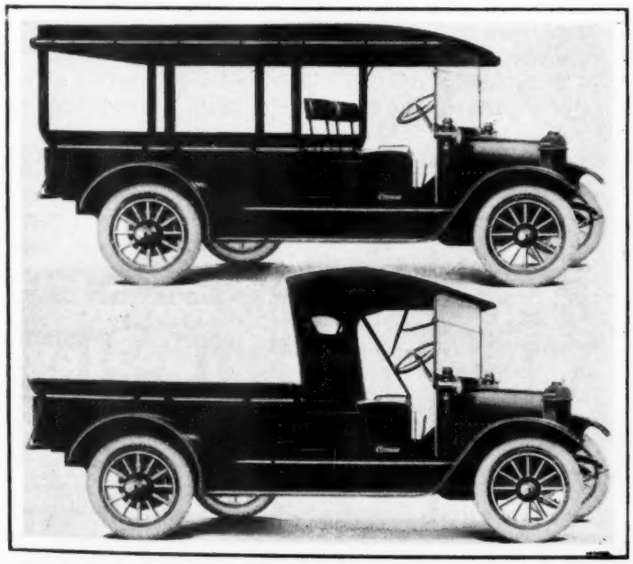
small. The leather cone clutch makes up with the gearbox and has a self-contained thrust as is shown in the drawing. Of course the gears are a very important part of any commercial car since they come into use so much more frequently and this gearset has been constructed to withstand any amount of hard usage. It may be noticed that the bearings are all large, especially the double row New Departure at the rear end of the main shaft.

Three-Point Suspension

Three-point suspension is used for the power plant, the front end resting on a dropped cross member of the frame. It should be noticed in the chassis plan that this cross member does not carry the radiator and the reason for this is interesting. It is certain that the frame of any car of this sort will weave, so the radiator has a stiff cross member with nothing to do save support the water carrier. This cross member is not riveted or bolted rigidly to the frame sides, but is secured by only two cap screws that are put through the upper flange of the main frame, one on either side. Any weave that takes place in the main frame cannot by any possibility, twist the radiator support, so the cooler is relieved of all stresses.

For the radiator cast iron top and bottom tanks are employed and the middle part consists of a nest of vertical tubes. The side pieces are plain pressed steel and contain no water. Thus should the radiator happen to be damaged it is easy to take out and replace the middle part without having to buy a complete new radiator. There is a large hinged filler cap through which water can be poured from a bucket without the least difficulty.

Coming now to the axles, the rear is a built-up construction with a stout cast steel center that carries the differential and bevel wheels, there are four differential pinions and large ball bearings to support the whole. As a type the axle is three-quarter floating, with Hyatt heavy duty bearings to carry the wheels. Brakes are 15 in. diameter and 2 in. wide so there is plenty of surface.



Two of the Commerce models for 1916. They have a capacity of 1,500 lb. and are made in various body styles

A point to be observed is that the Commerce company has abandoned the single universal joint construction in favor of two universals with a torque stay. The front axle is a heavy I beam section with nothing special about it, but the springs are quite a feature. Those at the rear are 50 in. long and no less than 3 in. wide while the front springs are 36 in. by 2¼ in. All shackles are bushed with bronze, and the rear end hanger which has a great deal of work to do has a large grease pocket which cares for the lubrication in the event of the driver neglecting his grease cups for a few days. In laying out the brakes the countershaft has been located on the line between the two front end hangers, so that movement of the axle does not affect the brakes.

Three Body Types

There are three standard body styles, a panel car, an express truck without canopy and with a mohair top for the driver, and an express car with wood top. All three complete vehicles cost the same $975. The thoroughness of the chassis work is equally apparent in the bodies. Of course it is not hard to make an open body strong enough, but a panel body that will not rattle or bulge after a year's hard service is a different sort of proposition. For the Commerce panel body plenty of good hardwood framing is used, the doors are solid enough for a 3-ton truck and the hinges and bolts so stout that the roughest sort of treatment could not hurt them.

Further all three bodies are well finished and carry their ruggedness in their appearance.

Standard tire equipment consists of United States pneumatics 34 by 4 in., non-skid on the rear wheels and plain in front, while one spare rim is included in the equipment. The windshield is in keeping with the rest of the fittings and the oil lamps are heavy gage material.

Calculating the Piston Displacement

EDITOR THE AUTOMOBILE:—Will you please explain exactly how to find the piston displacement of a motor in cubic inches?

2—Has the r. p. m. anything to do with the calculation?

Irving, N. Y. E. C. H.

—Piston displacement of the motor means the volume passed through by the pistons during one stroke. In other words, for each cylinder it is the cubical contents of a cylinder whose diameter is equal to the bore of the motor and whose length is equal to the stroke of the piston. With this in mind it is only necessary to give the rule for finding the volume of the cylinder which is the area of the sectional circle multiplied by the length of the cylinder.

The area of the sectional circle is equal to the diameter (squared) multiplied by .7854 and thus the formula becomes:

$$D = .7854\, d^2\, L$$

In this formula D is the displacement; d is the diameter of the cylinder or the bore of the motor, and L is the length of the stroke. Thus, for a 4 by 5 motor of one cylinder, the displacement would be:

$$.7854 \times 4 \times 4 \times 5$$

and for a four-cylinder motor it would be:

$$.7854 \times 4 \times 4 \times 5 \times 4 = 251.3$$

2—The r.p.m. have nothing to do with calculating the displacement unless you desire to bring in the factor of time. If you wish to know the displacement of a motor per minute, then you would bring in the factor of r.p.m. When speaking of the piston displacement of a motor, the r.p.m. have nothing whatever to do with the matter.

Very often it is desired to estimate the volume of gas entering the cylinder in a given time and when this is done the displacement for a given time is calculated. For instance, if it is desired to know how much gas is drawn into a motor for a period of a minute, it would be necessary to know the number of intake strokes per minute and multiply this by the piston displacement. This would give the theoretical amount of gas drawn into the motor, but as a matter of fact, since the volumetric efficiency of a motor is never 100 per cent, only a portion of this amount of gas would be drawn in. It is only with theoretical calculations of this nature that the displacement for a given length of time is used.

Wants to Increase Speed of Regal N

Editor THE AUTOMOBILE:—I would like to ask you for your advice on a few matters relating to my car, which, being of American manufacture, is difficult to obtain in England. I want to increase the road speed of this car and any help you can give me will be greatly appreciated.

1—I own a 1913 Regal model N, underslung car number 5085, and I am desirous of increasing the speed at the road wheels. How can I best obtain this—by either fitting a new ring gear and bevel pinion of higher gear ratio, lighter reciprocating parts to engine, or larger road wheels? The best speed obtainable at present is 35 m.p.h., but at anything over 30 m.p.h. the vibration is excessive.

2—Regarding the water circulation, the engine is cooled by what is known as thermo-gravity circulation, wrongly called thermo-syphon, but it could not very well be worse, the water does not circulate. Could not a circulating pump be fitted? If so, how and where? Would like the approximate cost of parts recommended.

3—Regarding the underslung frame, is there any real merit in this type of frame? If so, why do not more makers use it? Also, is it a part which the Regal company has discontinued using?

4—I get a slight leak from the bottom of the Model L Schebler carbureter. How can I prevent this? The cork float is good and the valves appear tight.

5—Can the rake of the steering column be altered?

Paignton, England. F. W. G.

—You can probably increase the speed of the car considerably by doing all the things which you suggest. The expense will be considerable, however, and possibly it would be better to rely simply upon a higher gear ratio and a change in the timing so as to put the spark further ahead for high speeds.

2—THE AUTOMOBILE has no record of what it has cost for previous installations of water pumps on cars in which the original cooling system was of the thermo-syphon design. The pump installation will be also a rather complicated matter on a car which has not been built for it, and it is impossible to estimate accurately what the cost will be for arranging the drive, etc. The work in fact, could not be attempted except by a shop where the equipment is complete and where those in charge of the work are mechanics of exceptional ability.

3—The Regal company has abandoned the underslung frame and so have other American manufacturers who at one time used it. The fact that it has fallen into disuse is sufficient to show there has been no real demand for it.

4—The repair of the leak will depend upon whether or not it is of a permanent nature of merely the condensation of the gasoline in the manifold after stopping the motor. If the gasoline leaks from the carbureter for a short time after

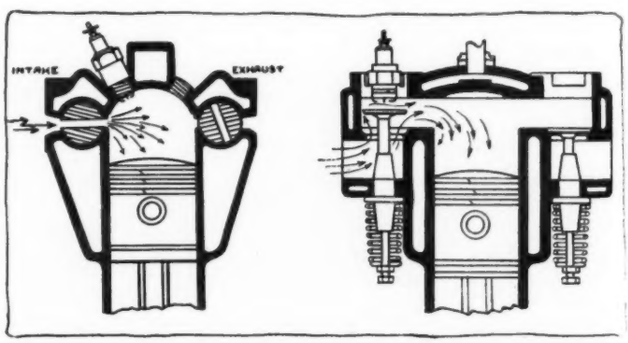


Fig. 1—One of the advantages claimed for the rotary valve motor is the direct flow of the intake gas

the motor is stopped, and then stops leaking, it is the gasoline which has been drawn up in the manifold condensing and then running back into the carbureter, causing it to overflow. The remedy for this is in the fitting of hot air connections which assist in thoroughly vaporizing all the gasoline. If the leak is a steady one it shows that the cork float is slightly water-logged, in which case it will have to be dried out and re-shellacked or the valve to the gasoline inlet does not seat tightly and will have to be ground in.

It would be advisable to make sure that the float valve seat and that the bowl gasket in the bottom of the bowl are in good condition with the float at the proper height, that is 1 1/16 in. from the top of the bowl to the top of the float. If these three points are correct, the carbureter will not leak.

5—The rake of the steering column can be altered by simply loosening the bolts which clamp the steering gear to the sub-frame and pulling the column down to the desired angle and then tightening the bolts again.

Interested in Rotary Valve Motors

Editor THE AUTOMOBILE:—I am interested in rotary valve motors and wish to learn the action and design of the Speedwell, Mead and any other well known design.

Do these motors cool the valve core or shaft by forcing water into them or simply cool by water-jacketing the container? If water is passed into the core, how is the connection made with the water pipe? How large a port area in square inches do these motors use to a certain cylinder size?

Fairfax, Mo. A. L. C.

—The Speedwell and Mead rotary valve are one and the same thing because the Mead rotary valve motor is used in the Speedwell car. The manner in which this motor operates cannot be better described than in the accompanying diagram, which shows the valve in various positions for a four-stroke cycle motor. As seen by the diagram, Fig. 2, the Mead rotary valve motor employs two rotating sleeves, one for intake and the other for exhaust, thus giving a sort of T-head construction, although the advantages of semicircular sections are maintained by the combustion chamber. In practice, the intake and exhaust rotating sleeves are made in halves, this being done so that longitudinal expansion of the rotating sleeve can be taken care of at the joint. For a six-cylinder motor one-half of the intake valve would serve three of the six cylinders and the other half coupled to it would serve the other three cylinders. The intake and exhaust valves are similar in appearance. The path of the gases through these sleeves is shown in Fig. 1. The method of drive for the valve can be anything desired, a common means being a worm mounted on a vertical shaft which drives the two valves which are directly connected to worm gears which mesh with the worm on the vertical shaft. Regarding your question as to the water-jacketing and cooling used in connection with these motors, the illustration of the castings employed in actual manufacture will clearly bring this out. The container of the valve is waterjacketed but the valve itself does not hold any water because to do so would mean a very complicated arrangement, since there would have to be some connection between the moving valve and the stationary part. The port areas in these motors are very close to the areas of the clear openings of large poppet valves, the gain being not so much in valve size as in valve timing.

Has Trouble with Overheating

Editor THE AUTOMOBILE:—I have a 1912 model B Abbott-Detroit. For the past two years this car has been heating, and several people have tried to remedy this fault without success. It is heating worse than ever now, and I would like to know what I can do. The entire system has been flushed throughout, radiator, cylinders, every pipe and water connection has been cleaned, carbon removed from cylinders, valves, pistons, etc. The spark has been advanced to the farthest possible position, the gas mixture cut as lean as possible, and the fan works all right. The oiling system has been thoroughly gone over and every part of the motor seems well lubricated.

Can you explain which way the paddle wheel in the water pump should go? It seems as though this wheel has been changed and I have put it on the way I am almost positive it should go, despite opposition, and I now leave it to you.

2—Will the placing of a heavy gasket between the cylinder blocks and crankcase, to lower compression, have any effect upon the cooling? This I notice has been done at some time.

New Smyrna, Fla. I. A. M.

—It would seem as if you had done about everything possible to overcome the heating in the Abbott motor, unless the water pump paddle which you mention has been placed in the pump casing wrong end to. The casing of the water pump on the model B Abbott consists of two parts, known as the body and the cover. The body is the larger half, while the cover is the smaller half. The body has the inlet connection to the cylinders, while the cover has the connection which draws the water from the radiator.

The body is the half which is closest to the front of the car and the paddle has one side entirely smooth with the exception of the hole for the pump shaft, while the other side has part of its surface cut away around the pump shaft hole to admit the passage of the water. Obviously, the paddle must go into the water pump body smooth end first, as if it is placed the other way around it would shut off the passage of the water, preventing it from reaching the pump, and hence the circulation would cease.

It can be readily determined whether or not the paddle has been placed in properly by merely taking off the radiator cap. When this is done and the motor is running the water can be seen circulating in the radiator when the paddle has been placed in properly and the pump is working.

2—The heavy gasket you mention as having been placed between the cylinder blocks and the crankcase was originally

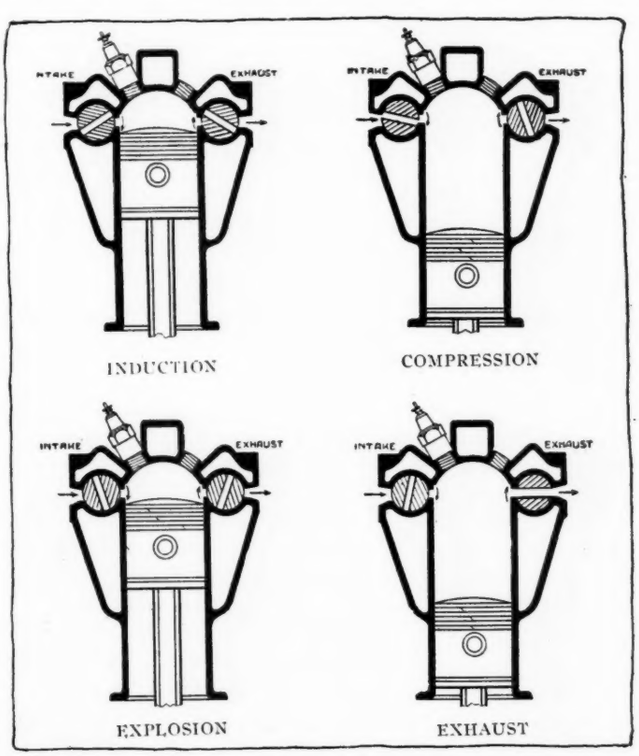


Fig. 2—Mead rotary valve as used on the Speedwell motor in different phases of its four-stroke cycle

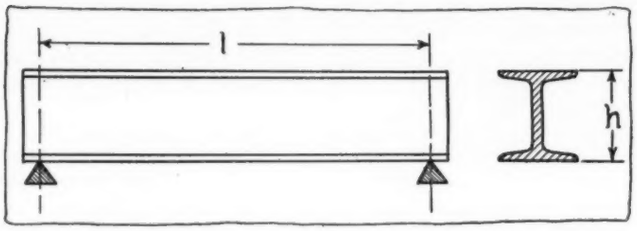


Fig. 3—Diagram of I-beam supported at ends, 1, is the length or span of the beam and h is its depth

put on the car at the factory, and this will not in any way affect the cooling system of the motor. If the trouble is not in the water pump paddle the only suggestions which apply are those which would be true with any gasoline engine having a water cooling system.

Causes for Jumping at 15 m.p.h.

Editor THE AUTOMOBILE:—My Ford 1915 model is inclined to jump or run unevenly when running at from 12 to 15 miles, but works satisfactorily when warmed up and at higher speed. The ignition, gasoline line and valves are in good order.

2—Can you advise me where I can obtain a float for a Holley carbureter?

Dresden, O. J. S. C.

—Without seeing the car it is very difficult to say what may cause a thing of this kind. In fact, the action of the car itself and the "feel" to the driver are largely what determine the points to be looked after in remedying the trouble. If the car goes along well and then suddenly acts as if the brakes have been put on, due to the fact that the motor misses fire or explodes unevenly and has to work against the compression of the dead cylinders, it is an entirely different feeling from that due to first weak and then strong explosion. Sometimes a slipping clutch will cause an uneven sensation.

It is possible that the commutator is dirty or that the valves are in such condition that they seat tightly enough for higher speeds, but at low speed permit a leakage of gas and hence they miss. Some of the units or contact points on the coil vibrators might be badly worn or dirty and need cleaning and adjustment. Sometimes the misadjustment in these coils is just enough to be noticed at certain speeds. At other times, a short circuit in the ignition may give an irregular action and this can be quite often detected by the buzzing of the coil unit continuously instead of intermittently. Some of the reasons generally given for the engine running irregularly at low speeds are the following:

1—Close gap between spark plug points.
2—Too great clearance between valve stem and pushrod.
3—Weak exhaust valve spring.
4—Air leak in intake manifold.
5—Coil vibrator improperly adjusted.
6—Spark plugs dirty.
7—Gas mixture too rich or too lean.
8—Poor compression on account of leaky valves.

Only Experts Drive in Big Races

Editor THE AUTOMOBILE:—Are only expert drivers allowed to race in the big events like Indianapolis, Chicago, Vanderbilt Cup, etc.?

2—What is necessary to become a professional driver?

3—What firms employ amateurs so they can acquire experience?

Newark, N. J. G. H. MESSER.

—Only expert drivers are allowed to race in events of this class.

2—To become a professional driver it is necessary to have the owner of some car designate you as the pilot of his vehicle and permit you to enter it in the contests. Generally before a man employs a driver he must become convinced of his ability, and, therefore, it is generally necessary to have some kind of work or practice which will enable you to prove that you are capable of handling high-speed racing cars.

3—No firms employ amateurs for the purpose of giving them experience in racing.

Kleinart Is Reconstructed King Racing Car

Editor THE AUTOMOBILE:—Is Klein's Kleinart the King racer reconstructed, or is it a new car?

2—What are the racing colors of the Maxwell and Sunbeam companies?

3—Has kerosene been used in the Maxwell racers since the 1914, 500-mile race?

Rye, N. Y. G. MCCULLOH.

—Klein's Kleinart is the King racer of last year entirely reconstructed. The wheelbase is now 108 in. whereas it was formerly 113 and the motor is now under the 300-in. displacement limit, having a Duesenberg motor, eight-valve, 3 63/64 by 6 in. bore and stroke.

2—As far as is known to THE AUTOMOBILE these teams have no definite colors. Some of the Maxwell cars have been distinguished by the use of American shields. As far as THE AUTOMOBILE has any record kerosene has not been used in any of the large races this year.

Building Garage Over a Creek

Editor THE AUTOMOBILE:—I am building a new garage which will reach over a creek and concerning the construction would like to ask the following questions:

I will have a span of 22 ft. across the creek and intend to use an I-beam suspension with an I-beam 12 in. deep, 5.21-in. flange and thickness of web 0.56 in. having a sectional area of 11.76 sq. in. How much load will one of these carry in the center supported at the ends only?

2—How many would you recommend for a span 22 by 50 ft., using 2 by 12-in. wooden joists set into channel of the beam on each side to lay the floor and being placed 16 in. center to center?

Crestline, O. O. F. F.

—The formula by which beams supported as you state are calculated is: $M = \frac{SI}{c}$ in which M is the bending moment, S is the unit stress on the part of the beam furthest from the neutral axis which is the center line in the case of an I-beam; c is the distance of the most remote fiber from the neutral axis which in the case of an I-beam is equal to one-half the depth and I is the moment of inertia. The part of the formula $\frac{I}{c}$ is known as the section modulus and for an I-beam this is equal to $\frac{Ah}{3.2}$ where A is the area of the section and h is the depth of the beam.

Substituting for the section modulus the dimensions given by you the value 44.1 is secured.

The formula for the bending moment for your beam then becomes: $M = 44.1\ S$. If the beam is to be loaded at the center the bending moment is equal to half the load on the beam times half the span. As the beam is 22 ft. long the bending moment at the center for a load of P (lb.) would be $5.5\ P$ and assuming the tensile stress to be equal to 16,000 lb. to allow plenty of factor of safety if the beam is of steel, and 14,000 lb. per square inch if the beam is of iron, the equation would become:

$$5.5\ P = 44.1 \times 16{,}000 \text{ or } 44.1 \times 14{,}000,$$

or the safe load would be about 12,800 lb. on a steel beam or 11,200 lb. for an iron beam.

The calculations given above are assuming that the load

is all concentrated at the center, but if the beam is uniformly loaded from one end to the other, as it probably would be in the way the building would be constructed, the safe load on this beam would be double that given for the load concentrated at the center. The figures given for safe load on steel and iron beams are those furnished by the Pencoyd Iron Works, Philadelphia, Pa.

2—This would depend on the floor load.

Motor of 2388.8 Piston Displacement

Editor THE AUTOMOBILE:—Kindly give me the S. A. E. rating and piston displacement of an eight-cylinder motor, the bore and stroke being 6½ by 9.

2—Is the magneto on a Reo six a high or low-tension?

3—What is the highest automobile license in Ohio?

Akron, Ohio. G. H.

—The S. A. E. rating of an eight-cylinder motor, 6½ by 9, is 67.6 hp. The piston displacement is 2388.8 cu. in.

2—The magneto on the Reo six is a Remy high tension.

3—According to our latest advices on Aug. 2, Ohio had 161,700 motor cars registered since the first of the year and estimates at that time were made that by the end of the year 175,000 cars would be registered. At that date the chauffeurs' licenses numbered 13,643.

Van Sicklen Uses Air Principle

Editor THE AUTOMOBILE:—Will you please explain what the "air principle" in speedometers is?

2—What is the construction of the Van Sicklen speedometer?

Lowell, Mass. J. C. C.

—The air principle, when referred to in connection with speedometers, generally deals with the method used by the Van Sicklen apparatus made by the Van Sicklen Co., Aurora, Ill. This speedometer differs from others in general use in that its operation is based upon the generator and calibration of a current of air. This air current is generated by a spiral gear pump which is driven in the conventional manner by a flexible shaft from one of the road wheels or from some portion of the transmission mechanism.

The illustrations, Fig. 4, show the construction of the instrument. The current of air generated is directed against a vein on the inside of the floating dial. The floating dial itself is a light inverted cup secured to a shaft that passes vertically through its center as shown in the illustration. The shaft forms an axis about which the cup is free to turn, and when the air current generated by the pump is directed against the vein on the inside of the cup, it tends to turn it on its axis.

Referring to the illustration of the floating dial, it will be noted that the mileage scale and figures are placed on the outer vertical face of the inverted cup and these graduations are visible to the driver. As the speed of the car increases, the speed of the little pump increases proportionately, as does the air pressure against the vein of the floating dial, but in order to regulate and calibrate the effect of the air pressure upon the dial, a channel is provided beneath the vein through which the air is allowed to escape. This channel is graduated in width so that the relation between the amount of air directed against the vein by the pump, and the amount allowed to escape under the vein is so balanced or proportioned as to hold the vein in such a position that the scale showing through the face of the dial indicates the speed.

For example, at 5 m.p.h., the pump is creating a draft of air against the vein, the force of which is so regulated by the width of the channel beneath it, though a certain proportion of the air escapes, that the Fig. 5 on the floating dial registers with the point in the center of the opening on the face of the instrument. In a like manner at 10 m.p.h., a greater draft is being directed against the vein of the floating dial by the pump, having a tendency to force it further around on its axis, and therefore the distance to which the dial or vein is turned is simply limited by the channel beneath the vein which governs the amount of air allowed to escape. A spiral spring is provided as shown at the top of the floating dial which tends to bring the dial back to zero and the air passage is so arranged that the resistance of this spring is compensated for.

2—The construction of the Van Sicklen speedometer is that shown in Fig. 4, and the principle of operation is that above described. This is what is known and referred to by the Van Sicklen company as the air principle.

Timing of Abbott-Detroit Four

Editor THE AUTOMOBILE:—What is the proper timing of the valves in the Abbott-Detroit?

From the sound of the exhaust, which emitted a half burned mixture, I decided that the valves were out of time so I changed the position of the camshaft two teeth, with the following results: More power, less fuel consumption, but with a greater tendency to heat.

2—What is the proper size of nozzle for the model 30, using the Stromberg carbureter?

New Smyrna, Fla. J. A. M.

—The timing of the Abbott four is such that the inlet opens at 11 deg. past top center, and closes 44 deg. past bottom center. The exhaust opens 45 deg. before bottom center and closes 11 deg. after top center. If you will arrange the camshaft so that the inlet on No. 1 cylinder starts to open at 11 deg. past top center, all the other timings will automatically take care of themselves, since with a unit camshaft such as employed in this motor, when one point is fixed, the timing is automatically taken care of.

2—The proper size nozzle to use on this car is No. 63.

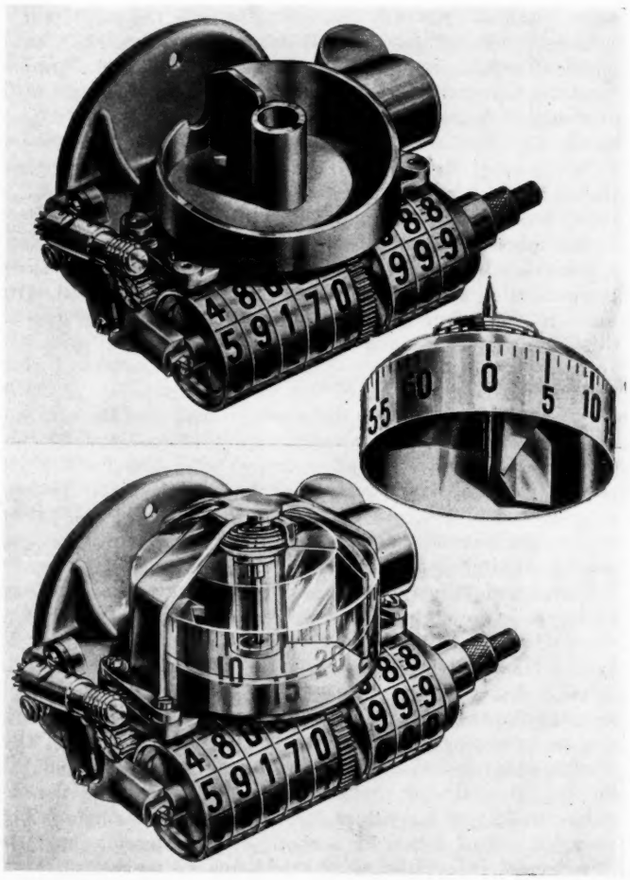


Fig. 4—Assembly views of the Van Sicklen speedometer, showing utilization of the so-called air principle

Car and Carbureter Design Suitable for Driving With Any Fuel

With a Study of Modern Carbureters Functioning with Automatic Brake Action on Fuel Feed at High Speed by Admission of Air in the Jet

WHAT is asked of cars in Germany under the present conditions of war and shortage of gasoline, with regard to their suitability for being operated with any fuel that can be obtained, throws a strong light on the requirements with which all cars may eventually be expected to comply in other countries, including even the United States, with a view to economy in motor operation and the establishment of a wholesome competition in the motor fuel market. A direct and immediate technical and practical interest also crops out, bearing upon the best carbureter construction in general and the use of 30-speed (1800 r.p.m.) and 40-speed (2400 r.p.m.) motors with heavy fuels for stationary and boat work as well as for motor vehicles.

Moreover, American manufacturers building cars and trucks for export are necessarily interested in those developments in the motor fuels which must influence the design of motors and carbureters, making for long stroke, high compression, small sizes and high speed in order to burn benzol and alcohol and even heavier fuels on an equality and optionally with gasoline.

The treatment which Baron von Löw has given this subject in his *Brennstoffmischungen, Anlassbehälter und Moderne Vergaser für den Automobilbetrieb* (Fuel Mixtures, Auxiliary Fuel Tanks and Modern Carbureters for Automobile Traffic), published by Kreidel, Wiesbaden, supplements in many ways the work by Dr. Dieterich rendered in abbreviated form in THE AUTOMOBILE of July 29 and Aug. 5 under the title: Analysis and Valuation of Motor Fuels and 14 Methods of Examining Them. Von Löw presents an extract of his book in *Automobil-Rundschau* for June, and this is rendered in substance in the following. The presentation is throughout based on experiments he has made to arrive at a construction usable without changes with different fuels. His reasoning and conclusions agree, it will be noticed, with some of the recent developments of the fuel feed system in this country.

The Merits of Auxiliary Tanks

We need in reality two different fuels to operate our cars sensibly, one for starting the motor from cold and another to utilize it to best advantage when hot. The fuels which can be used for both conditions are uneconomical, as long ago realized in the case of stationary motors. Naphthalene motors, for example, are operated with benzol until hot and are then switched to their cheaper main fuel.

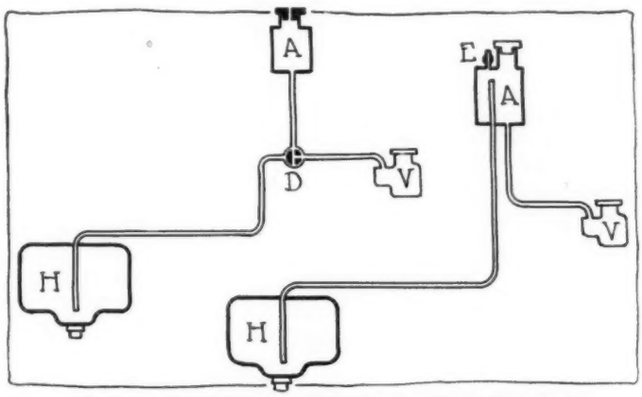
Figs. 1 and 2 illustrate two ways of arranging the auxiliary tank. H is the main fuel tank, A the auxiliary tank and V the carbureter. With the three-way cock D placed as in Fig. 1, the starting fuel flows to the carbureter and the motor can readily be cranked. After running for 1 to 5 minutes the motor is hot enough for the main fuel, and D can be turned on to admit it. An auxiliary tank on this plan facilitates measurements of fuel consumption and has the special merit for war conditions that it permits the car to be run 5 to 20 kilometers farther after the main tank has been put out of action by a shot. It is at least as good in this respect as a bullet-proof shield for the main tank.

Formerly auxiliary tanks were placed as in Fig. 2, with the object to avoid pumping pressure into the main tank after the motor has been stopped for some time. By admitting air through cock E the fuel then flows nevertheless at once to the carbureter and the motor can be started, whereafter the exhaust gases soon produce the necessary pressure in the main tank. For cars with an auxiliary tank a hand air pump is thus unnecessary and it is used only as a reserve for the case of certain troubles. But the older form of auxiliary tank, Fig. 2, is not adapted for present purposes—starting with a special fuel—since the fuel from the main tank flows through it and remains there after the motor has been stopped.

The Heating of the Liquid Fuel

The starting fuels which may be considered are benzol, gasoline and ether, and the main fuels are mixtures of benzol with alcohol, heavy petroleum and tar oils and also unmixed alcohol and the products of the cokeries using coal or lignite for raw materials. In order to use the heavier ones among these fuels it is necessary, besides using an auxiliary tank, to develop the heating of the carbureter more systematically than is usually done in automobile motors. Fig. 3 illustrates several possibilities in this respect.

The simplest means for improving the heating consists in using lead gaskets instead of asbestos at the joints of the induction pipe, P, P and bb. At the same time metal gauze can be laid across these joints, so as to heat the mixture not



Figs. 1 and 2—Arrangements for auxiliary fuel tank

only along the walls of the duct but all the way through it. The same object is served by piercing the suction channel with a hot-water pipe from the water jackets, as indicated at RR. These two provisions—the metal gauze and the pipe through the suction channel—involve a considerable reduction of the cross-section area of the channel and are therefore not usually recommendable, but in other places, such as the three marked *ss*, where they do not reduce the necessary area (the pipes being flared to offset the reduction) gauze screens are desirable for fire security.

Although in general the heating of the liquid fuel is much more advisable than the heating of the mixture, it has not been found a good plan to carry the fuel pipe in two or three coils around the exhaust manifold, as this heats a volatile fuel too much. For the fuels used in the experiments it was

sufficient to heat the carbureter by drawing exhaust gas from a sleeve surrounding the exhaust pipe and wound with asbestos cord. By providing the suction channel with a flop K it was made possible to draw cold air as well, when required. Fig. 3 shows further the two cocks HH with the aid of which an additional dosing with air can be provided for a fuel that requires it.

With a wrapped suction channel and an auxiliary tank as the only additions made to the normal car equipment and a few shims in reserve for loading down the carbureter float, the tests with the heaviest fuels were begun, the nozzles and the air intake areas remaining unchanged as used for operation with gasoline.

That a good carbureter can work with benzol—without extra loading of the float—equally as well as with gasoline—is a fact now widely known, but it was surprising that the car with the arrangements mentioned also ran pretty well with kerosene. To be sure, in previous experiments with an old car and an old spray carbureter, both of 1906 model, it had been shown that this old carbureter could work without any re-adjustment with ordinary alcohol and kerosene, but the motor speed at those tests had to be so high that normal operation of the automobile was impossible. With the new car and the new carbureter, both from 1914, the situation was quite different. Even at low motor speed the heavy fuel was here so well atomized that an explosive mixture was formed and the motor worked. On the other hand, high motor speed became precarious with kerosene for fuel. The throttle had to be partly shut to avoid knocking. It is well known that kerosene motors must have a larger combustion chamber than gasoline motors because a kerosene mixture gas is more easily fired by compression than a gasoline gas mixture, and therefore liable to premature ignition. That the throttle could not be opened interfered of course considerably with the utilization of the car with kerosene; it could only be driven at 40 kilometers per hour on level roads with the high gear in mesh while it should have reached 80 kilometers.

Mixtures of kerosene and benzol in equal parts gave much better results, but for lack of kerosene these tests were not continued. Mixtures of benzol and alcohol were taken up instead. Starting onto a measured stretch of road at 40 kilometers per hour and pushing the motor to its best it was observed what maximum speed was reached at a point further on, B, where a slight downward grade changed into a sharp upgrade, and also to what point the speed had dropped at C, at the top of the rise. Pure benzol gave 82 kilometers per hour at B and 56 at C, while a mixture of 1 part benzol and 2 parts alcohol gave 78 kilometers at B and 48 at C.

On another stretch of road where B lay somewhat higher than the starting point and C at the top of a sharp rise as before, pure benzol gave 65 kilometers at B and 62 at C, while the mixture gave respectively 62 and 56 kilometers and another mixture composed of benzol and alcohol in equal parts gave 64 and 60, or almost as good a result as the benzol alone.

[The author here goes on to show that a given volume and a given money value of the mixed fuels give more mileage than the same volume and value of gasoline and slightly more mileage than the same money value of pure benzol, but the comparisons are mainly of interest for the war conditions under which the price of gasoline has gone up more than that of benzol and the latter more than that of alcohol. He shows finally that, in order to make gasoline, benzol and alcohol equally economical, the prices per liter should be 42 pfennig for benzol, 35 for gasoline and 32.4 for alcohol, these figures holding strictly good only for such a car as was used by the author—with auxiliary tank and wrapped exhaust pipe sleeve and suction channel—while subject to some modifications for other cars originally less well adapted for being operated with benzol and alcohol.]

To illustrate, further, the possibilities for using different

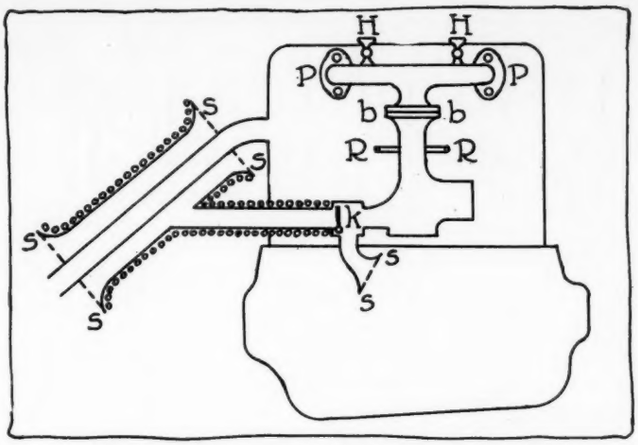


Fig. 3—Showing means for heating heavy fuels

fuels the author's practical experience supplies data of interest. For the past three years he has driven his cars mainly on benzol, and nothing was changed in the cars. Nozzles and jets, float levels and heating arrangements remained as they were, and yet the cars work better with benzol than with gasoline. When occasionally it was impossible to obtain benzol he was compelled to drive for a couple of days on gasoline, and in those cases there was always noticed a lessened ability to pull through on any given gearspeed, and knocking of the motor occurred easily—something which never happens with benzol. Similar observations were made with regard to cars driven by others. On the whole, he found that there were no drawbacks to the use of benzol for cars not of a decidedly antiquated construction; one of his own dating back, as mentioned, to 1906 and being used entirely without changes.

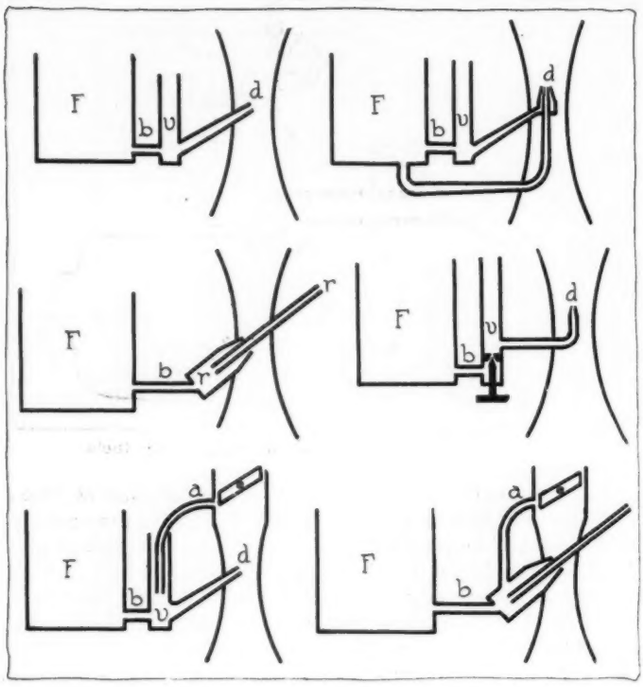
The much feared soot formation so often charged against benzol is in reality quite immaterial, as it occurs only during the first minutes after starting, and later, when the motor gets warm, the soot is gradually burnt out. The film of soot reaches therefore only a certain thickness, and it is rather harmful than useful to clean the spark plugs and piston heads frequently.

More astonishing than the fact that the modern motors work equally well with gasoline and benzol is the observation that they accomplish almost as good results with alcohol as well. This seems singular, since the caloric value of alcohol is so low and the attempt made 12 years ago to run the Berlin taxicabs on alcohol proved a failure. The answer is the following: The low caloric value of the alcohol is in part compensated by the related fact that alcohol requires much less air for its combustion than either gasoline or benzol, so that a cylinderful of explosive alcohol mixture after all contains nearly the same amount of energy as a cylinderful of the other explosive mixtures. And the early failures were due to the design of early automobile motors which had lower compression and shorter stroke than those of the present day.

The efforts made for improving the motors on general principles have incidentally and without intention resulted in meeting the requirements for employing benzol and alcohol as fuels.

The car with which the road test figures were obtained is the same Audi car with which director Horch of the Audi works took part in the 1914 Alpenfahrt (reliability run in the Alps). It has a motor with 90 millimeter bore and 140 millimeter stroke and weighs 1356 kilograms and is in the same condition in which it came back from the Alps, excepting the addition of the auxiliary tank and the stronger heating device.

If the figures obtained with this car are somewhat better than could ordinarily be obtained with vehicles of older date, other tests with two Horch cars of 1906 and 1908 and with



Figs. 4, 5, 6, 7, 8, 9—Diagrams of modern carbureters

two Mercedes cars of 1910 and 1912 have nevertheless shown that older cars with older carbureters can work very well with the new fuels. The mixtures of benzol with alcohol are especially to be recommended those who are nervous about the soot formation with pure benzol. By mixing the two fuels both the soot formation with benzol and the rust formation with alcohol alone are most effectually obviated.

Almost as harmless as the slight soot formation with benzol are the small explosions in the carbureter with alcohol. If the reports occur with a certain adjustment of the throttle, the best plan is to throttle down till they stop and then to open the throttle again by degrees, at each adjustment giving the motor time to get warmer. It will then in most cases work properly after coming back to the first adjustment. But if the driver gets fidgety and tries every two seconds if the explosions will occur when he opens up wide, the motor of course gets colder all the time and the explosions get more frequent. No doubt, the technics of motor construction are already so advanced that motors could be built now for all the fuels which on the whole would work more perfectly than the best automobile motors built for gasoline only.

Compression the Critical Feature

Among motorists catch phrases are very current. One of these has it that "the automobile motor is a gasoline motor," meaning to convey the idea that it is a risky thing to operate it with any other fuel than gasoline. But it is now an established fact—widely known and based on fundamental heat economics—that a good automobile motor works better with benzol and other fuels than with gasoline, and the phrase therefore holds true only for antiquated designs. There is general agreement on this point among motor engineers, and the author claims only the discovery that practical motor building is already much farther advanced than usually supposed and that results are obtained with the good automobile motors of to-day and modern carbureters which nobody had expected.

Another catch phrase says: "The fuel question is a question of carbureters." But this slogan is no more correct than the other. The fuel question is—like all important problems relating to internal combustion motors—a question of the compression. But a good carbureter can contribute to the solution of fuel problems.

[It was well understood as early as 1902 that alcohol motors should have a long stroke and a compression of 140 lb. In the modern European automobile motor the long stroke, the high piston speed made possible by improved balancing and better materials and workmanship, the large valves giving a full charge and the moderately high compression—made actual by the speed and the valve dimensions, while in 1902 it was theoretical only—have produced conditions for operating with mixtures of benzol and alcohol which really agree perfectly with the requirements formulated after the government tests with pure and mixed alcohol fuels conducted in France and Germany in 1901 and 1902. The statements made by von Löw are therefore not so radical or surprising as they may seem at first glance.—M. C. K.]

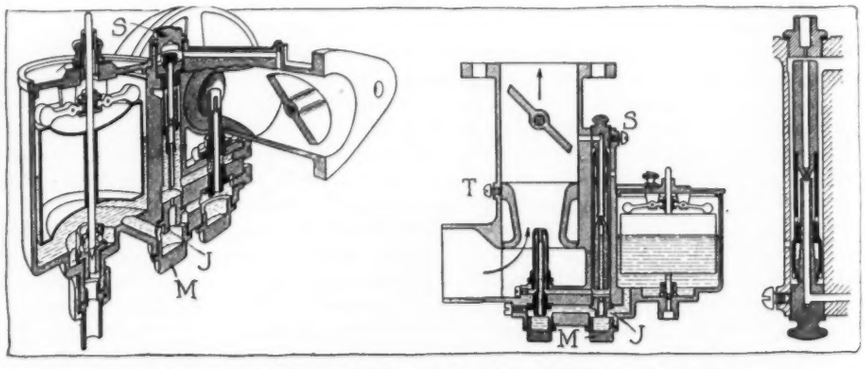
Spray Carbureters With Air Brake

Considering that the adoption of the principle of checking the fuel feed by admitting air to the interior of the jet (*Bremsdüsenprinzip*) stands for an improvement of carbureters which has only been accomplished during the past few years and contributes strongly to our ability to operate with different fuels, a review of the modern carbureters representing this type of design will be found in order to complete the presentation of the subject.

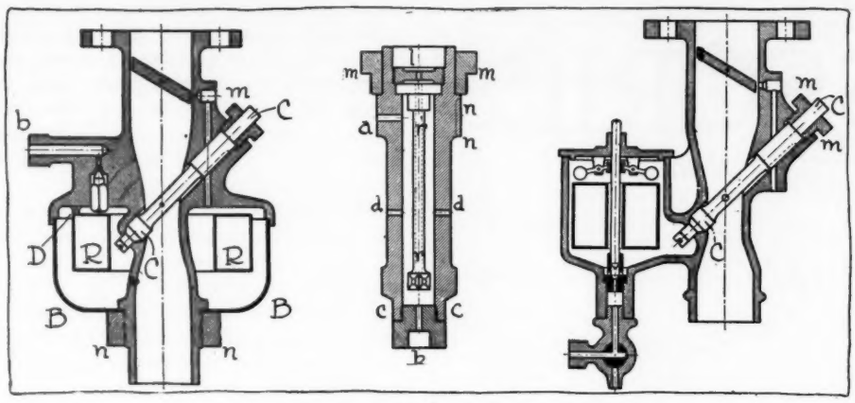
The principle is shown in Fig. 4. F is the float chamber, *b* the brake-jet, *v* a storage compartment and *d* the spray jet. When the opening of the throttle valve suddenly causes a strong suction, the fuel in the storage compartment serves for the acceleration, and when the motor has reached high speed the level of the stored fuel is reduced and air enters with it into the spray jet, while the brake jet *b* supplies fuel relatively slowly (due to the interference of the air). The Zenith carbureter has also another jet, as shown in Fig. 5, and in the Pallas carbureter, Fig. 6, the storage space is differently arranged and the brake air enters through the tube *rr*. A third carbureter, being the German Longuemare, is represented in Fig. 7. Here the brake jet is subject to regulation, while those in the Pallas and Zenith are easily exchanged. That these two carbureters also have a special starting jet *a* opening opposite to the edge of the throttle flop, on the plan indicated in Figs. 8 and 9, is a matter not concerning the main principle; similar starting jets are used in carbureters such as the Favorit, which have no brake jet arrangement.

Among 14 carbureters entered in the competition held in February, 1914, by the Prussian war department three were of the brake jet system, and they took the first three prizes.

Some of the details in the carbureters of this type illus-



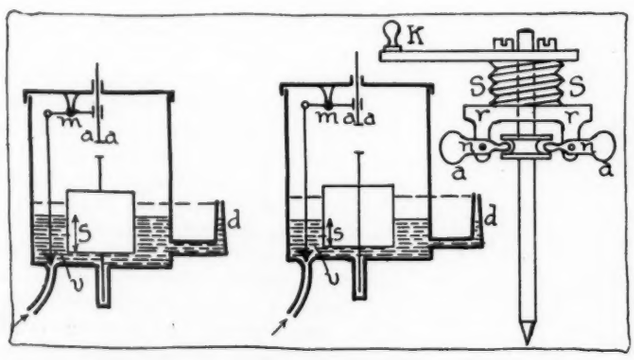
Figs. 10, 11, 12—Details of Zenith construction; horizontal and vertical



Figs. 13, 14, 15—Details of Pallas construction

trate the requirements in which motorists are interested. The Zenith, whose first appearance in the market led all carbureter technics into new paths of progress, is made in a horizontal model, Fig. 10, and a vertical model, Fig. 11. These illustrations show a number of narrow passages which are not readily accessible, and to remove jets and various screws special spanners are required. Both models have a special starting or still-running carbureter which can be taken out by removing or loosening the screws S. It is shown separately in Fig. 12. In the course of the years this auxiliary part has become more and more elaborate, due to the exaggerated demand for very slow still-running. The success accomplished in this respect is interesting, showing how patiently carbureters and motors can be made to behave. But in itself the capacity for slow still-running gives no guarantee of excellence in more important things, as there is a great difference in the carburetion requirements for slow-running without load and slow-running with full load.

The Pallas carbureter, Fig. 13, has the same admirable workmanship as the Zenith and can be taken apart without special tools. The jet mechanism *cc* can readily be taken out after removing the nut *mm*. Its details are shown in Fig. 14. At the upper end there is the air duct *l* from which air is led through the tube *rr*, referred to before in the diagram, to underneath the fuel, which it helps to atomize by forming bubbles. The fuel enters through the brake jet *b*, Fig. 14, and is delivered through spray jet *dd*. The channel *a* leads to the starting jet. The conical surface *cc* forms a tight joint separating the jet mechanism as a whole from the contents of the float chamber. The latter, BB, Fig. 13, is pressed and very light and secured by a large nut *nn*. The float RR is of the annular type, which, however, makes it less accessible, so that it is not so easy to load it down when a heavy fuel is used. The ideal would therefore be a Pallas carbureter with a lateral float chamber on the plan shown in Fig. 15 and also with the method for float adjustment used in the Lyma carbureter.



Figs. 16, 17, 18—Means for adjusting float level

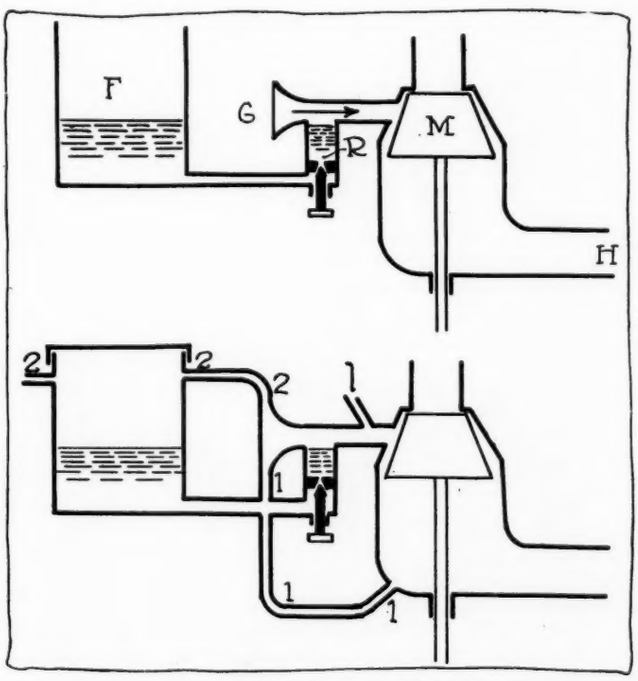
A lateral float can readily be adjusted to the specific gravity of the fuel by placing perforated disks or shims on it. With the Lyma carbureter this adjustment is accomplished as follows: Fig. 16 represents a float dipping into light fuel to the depth S, just clearing the bottom of the chamber. In Fig. 17 the float is in a heavier fluid and begins therefore to float at a smaller depth of immersion *s*. Both the light and the heavy fuel must reach the level of the dotted line, in the chamber and in the jet, for normal work. This can be effected by making the abutment *aa* adjustable. When the float spindle strikes against the abutment the feed valve *v* is closed in both cases and, if the abutment *aa* is placed higher for the heavier fluid, as indicated in the illustrations, the level in the jet can be the same as for the light fuel. The abutments can also be made adjustable by having the fulcrums *m* movable, and this is the expedient used in the Lyma carbureter, the mechanism being shown in Fig. 18. The fulcrums *nn* here correspond to *m* in Figs. 16 and 17, and the lowest points *aa* of the balls to *aa* in these diagrams. The fulcrums *nn* are secured in a red-brass casting *rr* which can be screwed up and down in the cover of the float chamber by means of the high-pitch thread *gg* and the crank *k*.

The crank can be turned 240 deg. and this allows for a change of specific gravity from .65 to .92. A dial on the cover gives the intermediate figures, so that it is easy to place the crank arm in the proper place for each fuel—for benzol at .88, for example, for alcohol at .82 and for ordinary gasoline at .72.

The Lyma can be counted among the brake jet carbureters, because the fuel feed at high motor speed is so much reduced by means of a throttle-jet that the air feed through the other intake is very much increased, on the plan shown in Figs. 19, 20, 21 and 22.

The fuel is not thrown out in a stream from a jet in this

(*Continued on page* 298)

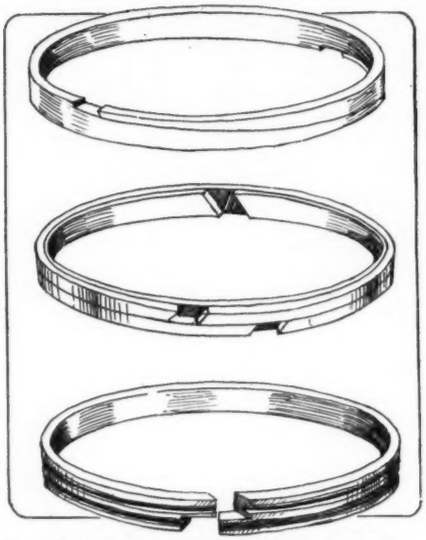


Figs. 19, 20—Diagrams of Lyma fuel feed control

ACCESSORIES

Peerless Piston Rings

THERE are three sections in the Peerless piston ring, there being two outer rings, each half the width of the ring groove in the piston, and these are superimposed on a wide inside ring, the latter being as wide as both the outer rings together. All joints are broken while the proper spacing is maintained by means of small pins. The joints are simply diagonal cuts. Wherever there is a joint there is a seal formed by the solid metal of another ring, so that there is no passage left for gas or oil leakage. Peerless rings are all made eccentric. Stock sizes are from 2⅜ in. in diameter to 6 in. in diameter while the widths vary from 3/16 to ⅜. Prices: All sizes up to and including 3½ in., $1.75; up to and including 6-in. size, $2.—Peerless Piston Ring Co., Newark, N. J.



Top—Inland piston ring. Middle—The Peerless ring. Bottom—No-Leak-O ring

Inland Piston Ring

A novel design of piston ring has been brought out under the name Inland. It is a one-piece concentric type featured by the fact that the end joints of the ring are absolutely staggered and hence there is no possibility of aligning the joints and hence causing leakage.

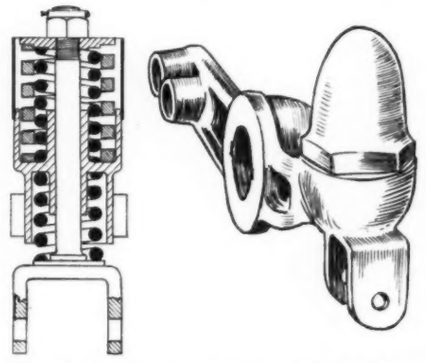
The ring is a concentric design and is cut on a spiral with the free end tapered thus, according to the makers, giving the advantages of the eccentric type. To get the advantages of concentric design the free ends are so supported, as shown in the accompanying illustration, that they give uniform thickness to the entire cross-section. A third advantage which is stated to correspond to that secured in more than one-piece ring, is given by the fact that the rings are slotted to less than one-third their width at opposite points on the circumference of the ring. The object of the construction is to give uniform pressure at all points on the cylinder walls with sufficient elasticity to render them harmless to the cylinder. The distortion of the rings is unlikely as heat-treatment is given before grinding. The price of the ring depends upon the size employed.—Inland Machine Works, St. Louis, Mo.

No-Leak-O Piston Rings

The No-Leak-O piston ring is distinguished by the use of a step-lap joint, a groove between the sliding face forming the step-lap joint on the side of the ring. It is this latter groove which makes this ring different from others on the market which employ the step-lap joint. The joint gives a tight seal at the ends of the ring while the oil fills the groove which forms a seal around the ring giving a tight fit and preventing the escape of gas. At the same time the oil lubricates and forms a packing or seal against the oil being drawn or forced up into the firing chamber.

The grooves control the oil. The cylinder walls are constantly lubricated by the oil from the grooves and the grooves take up fresh oil as fast as the supply is depleted by lubrication. This oil seal is said by the manufacturers to greatly reduce the quantity which works its way up into the combustion chamber.

The rings are made in one piece from seasoned stock and are stated to be resilient and not to clog or lose their efficiency. The price varies, of course, with the size employed.—Automobile Accessories Co., Baltimore, Md.



Left—O.M.C. light car type shock absorber. Right—Hup absorber for model 32 Hupmobiles

Hup Shock Absorber

Shock absorbers for model 32 Hupmobiles use a helical spring for absorption of shocks, the spring being contained in a bracket, as illustrated herewith. Adjustment may be made by removing the cap inclosing the spring and turning a hexagonal nut on the spring bolt. Price is $10 per pair.—Miller & McLean, New York City.

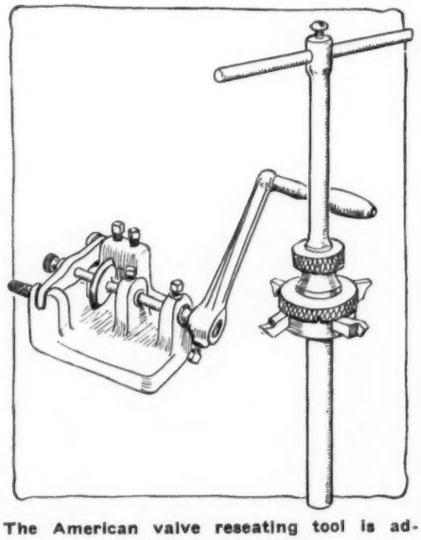
O. M. C. Shock Absorbers

O. M. C. shock absorbers are made in two distinct types, one for heavy and the other for light cars. Though differing considerably in constructional details, they are alike in one respect: they are designed to check excessive spring movement both up and down—in other words, they are double acting.

The heavy car type is made with two cylinders. The plunger rod carries at its lower end a piston which works in a liquid. A valve in the piston opens only when the piston rises; when the piston descends the only passage for the liquid —oil—is through a few small holes. The upward movement of the piston is resisted by a coiled spring.

When the leaf spring of the car is compressed the coiled spring is brought into play; when the rebound occurs the hydraulic brake acts, easing and checking the up-throw. Thus the piston rises without hydraulic resistance, but is checked by the oil on its descent.

The light car type employs springs only and the cylinders are single—that is, there is one cylinder for each car spring. The cylinder is divided into two compartments, as the accompanying illustration shows. In the upper one is the main spring, which is double, the outer and heavier spring, of square section steel, being reinforced by the inner and lighter spring, of round steel. The lower compartment contains a single spring of round section. The cylinder slides on the central rod, the upward



The American valve reseating tool is adjustable to any valve

movement being checked by the two upper springs and the downward movement by the lower single spring. Prices are: Heavy car type, for cars of 1500 to 2000 lb., $35 per pair; to 2600 lb., $35; to 3300 lb., $40; to 3900 lb., $40; to 4500 lb., $45; over 4500 lb., $45.

Light car type, for Fords, $8 per pair; $15 for four.—A. J. Picard & Co., New York City.

American Valve Reseaters

American valve reseating tools can be adjusted to suit the valves of practically any car. The valve facer consists of a cast iron base with bearings for a short shaft mounted directly in line with a bushing for the valve stem, and a holder at one side for the cutting tool. The valve is placed with its stem in the bushing and the shaft turned by means of a crank, driving the valve through a connection provided for the purpose. By adjusting the cutters to the proper distance from the center valves of any size can be faced. Six bushings of different sizes are furnished.

The seating tool consists of a head carrying four cutters, a stem entering the valve stem guide, and an upward extension with a T-handle for turning the tool. On the cutter head are two large knurled nuts; turning one loosens the adjustment and turning the other sets the cutters to any size within the range of the tool. When set, turning back the lock nut holds the adjustment. Two sizes are made, one seating valves up to 1¾ in. and the other from that up to 3 in. Price, either size reseater, $6; facing tool, $6; seater and facing tool together, $10.—American Valve Tool Co., Stamford, Conn.

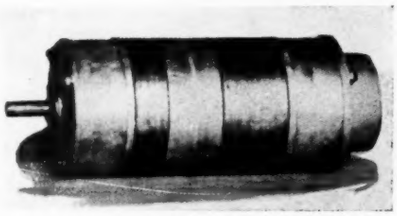
Sly Overland Tire Lock

A tire lock designed especially for Overland cars is manufactured to take the place of the upper strap which holds the tires. To attach the lock two cap screws which hold the bracket for the top strap are removed with a socket wrench and the lock put in its place, using the same bolts. When the tire is in place the bolts cannot be removed. The locks are made in two types, single and double. Price, single, $1.50; double, $1.75.—W. W. Sly Mfg. Co., Cleveland, Ohio. Distributed by New Era Spring and Specialty Co., Detroit, Mich.

Apco Ford Tire Holder

A tire holder designed to carry the extra demountable rim or spare wheel on Ford cars is announced by the Auto Parts Co. It resembles in construction the side tire holders which have been brought out for Fords by the same concern and includes an automatic locking clasp which permits of easy and rapid removal or replacement of a spare. The new design is for attachment to the running board and the clasp is provided

Apco tire holder for Fords with fittings



Rae motor-generator for Ford cars

with an easily operated lock. The makers claim that a spare can be removed or replaced in 5 sec. The retaining screws are not accessible when the clasp is closed so that it is impossible for thieves to readily remove the holders. Finished in black enamel the new holder sells for $2.—Auto Parts Co., Providence, R. I.

Autoprotector

The Autoprotectors are instruments to be mounted on the front axle of a car or truck and connected with the throttle, the air supply or the ignition system in such a way that if the car is driven too rapidly over rough roads or under other conditions that subject it to severe shocks, the car will be slowed down or even temporarily stopped. The device is adjustable as to the severity of the conditions under which it will commence to act and can be sealed.

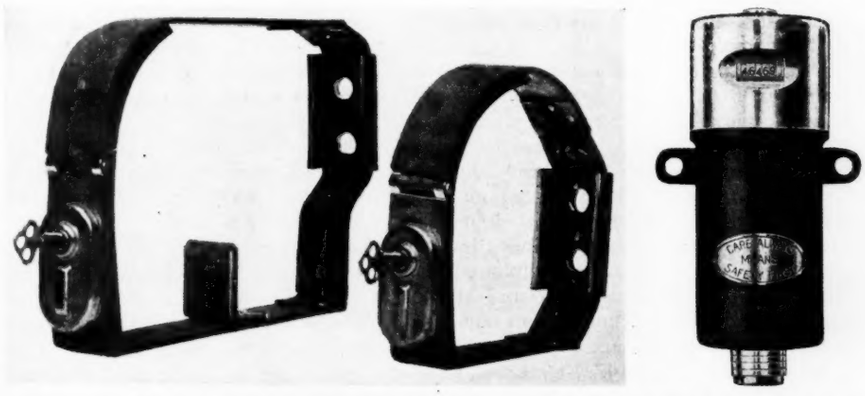
Inclosed in the casing is a weight which is held in normal position by a spring, but which is displaced by sudden shocks and is prevented from returning immediately to its normal position by a dashpot, the piston rod and piston being attached to the bottom of the weight. The weight is connected to the Bowden wire which acts on the throttle, air supply or ignition. A succession of shocks will tend to keep the weight out of its normal position and the speed of the motor will be affected in proportion to the amount of displacement of the weight. A counter attached to the device shows the number of abnormally severe shocks experienced, and this acts as an additional check on the driver. The device commences operating as soon as the first shock is transmitted to it. Price, with counter, $25; without counter, $18.—Autoprotector Co., Dorchester, Mass.

Rae Ford Electric System

The Rae is a small, simple motor-generator for starting and lighting Ford cars. It is used in connection with a 12-volt battery and operates at one and a quarter times crankshaft speed when running as a generator, while as a starter it is claimed to turn over the motor at 400 r.p.m. The starter action is actuated by pressure on a button, the connection being electrical. The Rae unit, which is shown in the accompanying illustration, is furnished with the necessary wiring, cutout, etc., and is installed so that the drive is directly from the crankshaft by silent chain. It is mounted on a saddle secured by three cylinder-head bolts and is supported by a bracket attached to the motor base.—Morgan Electric Co., Detroit, Mich.

Rels Brazing Metal

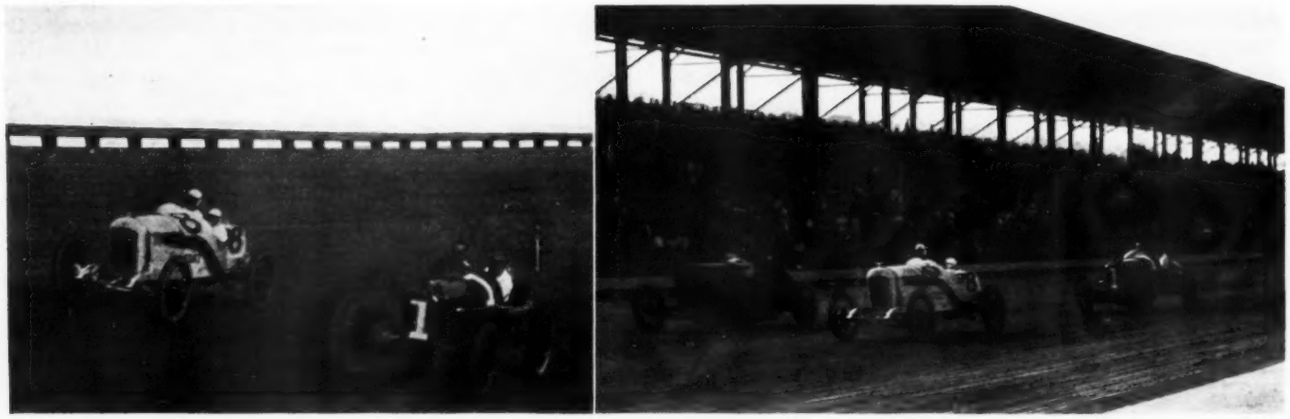
This product is a metal for brazing or soldering aluminum; the metal is too hard for use with a soldering iron, so a gasoline torch or its equivalent must be used. The surfaces to be united are heated to bring all oil to the surface and are thoroughly cleaned, scraped bright and the abutting edges chamfered, much as in ordinary brazing. The surfaces are tinned with the metal, no additional flux being required, and are united by running in more metal to fill up the V formed by the chamfers. The metal sells for 50 cents per bar.—Rels Mfg. Co., Brooklyn, N. Y.



Left—Double Sly tire lock for Overlands. Center—Single type. Right—Autoprotector to prevent overspeeding on rough roads, etc.

Resta Wins Century at 101.86 M.P.H.

Battles with Stutz for Leadership Until Tires Turn Scales —Burman is Third



Left—Cooper passing Resta on a turn and taking the lead only to lose it on the straightaway. These two ran wheel to wheel for 80 miles, averaging 104 m.p.h. Right—Passing the grandstand—left to right—Burman (9), Cooper (8) and Resta (1). Burman drives 104 m.p.h. and passes Cooper running second to Resta on the 28th mile.

CHICAGO, ILL., Aug. 7—The distinction of winning the first automobile race in America at a speed of over 100 m.p.h. was carried off by Dario Resta at the 2-mile board speedway here to-day by winning the 100-mile challenge race at a pace of 101.86 m.p.h. and defeating his three rivals Cooper in a Stutz, Burman in another Peugeot and Oldfield in a Delage. Resta put his Peugeot over the 100 miles in 58 min. 54.2 sec., finishing 52 sec. ahead of Cooper who was the only real rival he had. Burman was nearly 3 min. behind, having had two stops for tire troubles as compared with one stop each by Resta and Cooper; and Barney Oldfield, whose new Delage with four carbureters was not well tuned up, stopped at the end of 96 miles, having been lapped several times by the other drivers. Cooper's average was 100.58 and Burman's 97.78 m.p.h.

Fully 20,000 spectators sprinkled through the huge grandstand, in the bleachers, on the back stretch, and from the parking spaces in the infield, watched the 100-mile challenge duel, the first of the kind ever held on a speedway in this country. The weather was perfect and the track in condition. The four cars were sent away at a flying start, Oldfield having drawn the pole position acting as pacemaker. Resta was second from the pole. Cooper third and Burman on the outside.

From start to finish the race was Resta's. His Peugeot was seen to have the necessary speed, although from the start Cooper disputed the laps with him. Burman had apparently a lot of speed, but when he began to show it he ran into tire troubles and fell behind leaving Resta and Cooper to dispute the lead. Both Resta and Cooper made one tire change each. Resta changed a right rear at 74 miles and momentarily Cooper shot his Stutz into the lead, the crowd cheering to the echo as the Stutz entry was the real hero of the day with the grandstand and bleachers. Resta made the change in 35 sec. but was nearly 56 sec. behind Cooper when he got going again. This put him nearly three-quarters of a lap behind. He started, setting a faster pace to overtake the Stutz, but at 80 miles Cooper was seen to slow up on the back stretch; a right rear had given way and he had to travel at reduced speed for a mile to the grandstand pits. In the meantime Resta had seized the moment and was back in the lead.

Before Cooper could make the change and get out Resta had a lead of 51 sec. on him, or nearly three-quarters of a lap. With only 20 miles to go Resta at once slowed down from a momentary pace of nearly 110 m.p.h. to 102 and held it until the finish. In the meantime Cooper was pushing his Stutz, gaining each lap, but there was not enough time remaining to overcome Resta's lead, and he finished 52 sec. behind.

The average speed of 101.86 m.p.h. for the century does not represent the real speed of the race, the stops made by Resta and Cooper cutting the speed from 104.35 m.p.h. which the leaders had maintained from the start up to over the 75th mile when tire troubles began. Many expected that the pace would be much faster at the start as it had been in the opening 500-mile race in June, but the drivers apparently profited by the experience and decided to hold a rather conservative pace at which the tire troubles would be a minimum. Last June the pace set at the start was 108 m.p.h. and tire troubles started at 17 miles and before 25 miles were covered there were many tire changes. To-day the pace for the first 10 miles was 104 m.p.h. and practically this pace was maintained until the finish. The first five laps are a fair criterion of the speed as follows: Lap one, 101.41; lap two, 104.35; lap three, 105; lap four, 104.65 and lap five, 104.65 m.p.h. From the 10-mile mark the pace was a steady one up to time of the tire troubles. All three cars, Peugeot, Stutz and Peugeot had higher speed possibilities which were apparently held in reserve.

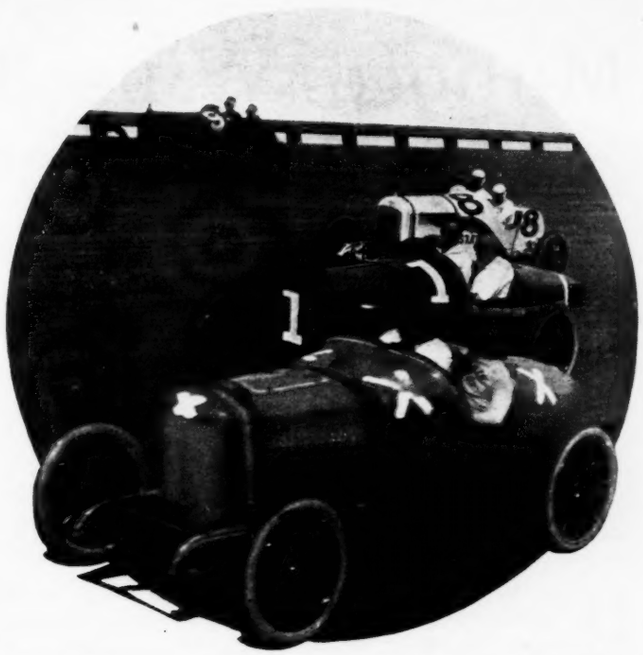
A Perfect Start

From the spectacular viewpoint there were some tense moments in the 58 min. of racing, but the grandstand did not have all the chances to applaud that it wanted. The start was perfect, all four cars were sent on a pace lap with Oldfield at the pole setting the pace. As the tape was approached the pace was easily 90 m.p.h. and all four crossed in a row, the red flag fluttered and they were off.

Lap two brought the first sensation, Cooper putting the Stutz into the lead at three-quarters and leading the Peugeot over the tape by three lengths. It was what the crowd wanted and it cheered. Burman was now 100 yards back, a position he held for nearly 20 miles. Lap three saw another change, Resta passing Cooper on the backstretch and leading over the tape by three lengths. The pace was 105 m.p.h. Lap four brought a thrill when Cooper and Resta were practically side by side, Resta leading by 2 feet. The next lap was Resta's by a length, so were the next three, but lap nine brought Cooper into the lead with a margin of two lengths. So the see-sawing continued. Resta led for three more laps, then Cooper took three in a row; Resta then took three more, Cooper sandwiched in one, then they alternated for three or four more laps, scarcely a length separating them. Resta would pull away on the straights and Cooper would ride fast on the bank and overhaul the Peugeot. This continued until the tire episodes at 74 miles, when the grandstand had its turns in cheering for respective favorites.

Burman's Tire Luck

Burman furnished his sensational burst of speed at the 20-mile point. Up to this time he had been trailing nearly 100 yards behind Resta and Cooper. Suddenly he started picking up a few yards on each lap, almost imperceptibly, when suddenly at the twenty-sixth mile he was on the heels of the leaders and crossed the tape actually a few inches ahead of Resta but a few inches behind Cooper who was leading. It was one of the spectacular parts of the race. The cars could not have been closer together and traveling at over 105 miles per hour. It was the moment the crowd had waited for, they were all on their feet, the air was filled with cheering. But this three-cornered duel, while not so spectacular, continued for the next twenty miles, Burman being mixed in the group at the end of each lap. The pace proved too much for his tires and at 42 miles he dropped back and had to change a right front, leaving Cooper and Resta to battle for the honors. From this time Burman was not up in front or near it again. He ran 20 seconds back, some laps gaining a few seconds only to drop them in others. At 72 miles he stopped again to change a right rear, and any driver who has to make two tire stops in a 100 mile race has little chance of winning.



The first lap on the curve—Burman (9), Cooper (8), Resta (1), Oldfield (X), approaching the starting line at 90 m.p.h.

Oldfield's tire troubles started earlier than might be expected for the pace he was setting. It was in the fifty-second mile when coming down the homestretch ahead of Resta and Cooper who were about to lap him the second time, that a right front tire blew, but his car never wavered. He stopped on the next lap and made a rapid change. He made two other stops.

Resta's Peugeot was lubricated by Oilzum. The times of the four drivers at every 10 miles of the race are given in the following tabulation:

Times in Chicago Challenge race at every 10 miles

Driver	10	20	30	40	50	60	70	80	90	100 miles
Resta	5:45	11:31	17:22	23:10	28:58	34:49	40:41	47:19	53:08	58:42.2
Cooper	....	....	17:22	23:10	28:58	34:49	40:41	47:04	53:50	59:34.4
Burman	....	....	17:23	23:10	30:30	36:17	42:59	48:47	54:35	61:22.4
Oldfield	....	....	20:01	26:22	34:06	40:21	47:51	55:26	62:31	out

Continental Motor Adds to Muskegon Plant

MUSKEGON, MICH., Aug. 7—Two additions are being made to the already large Muskegon plant of the Continental Motor Mfg. Co., which is practically entirely devoted to the manufacture of four-cylinder motors. Also the main building, shown in the foreground, will soon need to be reconstructed to give more floor space. One of the new buildings illustrated as under construction is 54 by 150 ft., and the other is 70 by 330, the latter being V-shaped. Both buildings are four stories in height and together they will increase the floor space over 125,000 sq. ft. and will permit the doubling of the present working force of nearly 2000. The added facilities will raise the production of four-cylinder motors from 4000 to 6000 per month, and the cost will be from $300,000 to $400,000.

Mulford Wins 300-Mile Race on Des Moines Speedway

Finishes in Duesenberg 1 Min., 7 Sec. Ahead of De Palma's Stutz—Race Was Duel Between These Two and O'Donnell's Duesenberg—Two Serious Accidents Mar Contest

Order of Finish Des Moines 300-Mile Race

Duesenberg	Mulford	3:27:05.33
Stutz	De Palma	3:28:12.02
Duesenberg	O'Donnell	3:31:45.51
Du Chesneau	Brown	4:26:22.18
Clergy	Barndollar	4:40:35.02
Cooling	Henderson	5:01:43.25
White	Shrunk	5:09:54.13
Ogren	Alley	5:10:13.08

DES MOINES, IOWA, Aug. 8—The new 1-mile board speedway was opened in this city to-day by Ralph Mulford winning the 300-mile race in a field of eleven starters at an average speed of 87 m.p.h. and defeating by 1 min. and 7 sec. Ralph De Palma, who drove a Stutz and who was announced a winner after the race. Owing to the speed, the 1-mile track, and inadequate timing arrangements an error was made in the announcement and after hours of checking the lap records, Mulford was declared the winner and entitled to the $5,000 for first place, De Palma receiving $2,000 for second position.

The opening of this new speedway was unfortunately marred by two accidents, each of which resulted fatally. Joe Cooper, Sebring, Ohio, driving a Sebring, blew a tire in the thirty-ninth mile when running in second place, and close to De Palma's Stutz. The accident happened when traveling at 90 m.p.h. at the end of the turn into the home stretch. Cooper's left rear tire blew, swerving the rear end of the machine toward the inside of the track and putting the car at right angles on the track. Cooper fought to hold it on the track and succeeded in keeping it from running off the inside only to have it skid a distance of 30 feet into the railing at the top. This railing crumbled like tissue paper, and the car with the driver and mechanician fell over sideways to the ground below. Cooper was caught beneath the edge of the machine and died immediately. His mechanician, Peio, was thrown clear out of the car. The accident happened directly opposite the grandstand.

The other accident occurred in the 240th mile when William Chandler, traveling in fourth place, went off the track at the inside, due to the breaking of the left rear wheel. Before going off the track the car skidded half way up the board surface on the back turn, then turned over, and landed through the guard fence 40 ft. from the inside of the track. Chandler and his mechanician Keller were thrown clear, but Keller died a few hours later due to a combination of injuries, and Chandler is now out of danger.

Trio Fight Duel

The race from start to finish was a masterly fought duel among Mulford in a Duesenberg, De Palma in a Stutz, and O'Donnell in another Duesenberg. It was either Mulford or De Palma's race until 297 miles had been covered when the two were running wheel to wheel, and had been for 20 miles, when De Palma blew a tire, and although he made a speedy change it was impossible to catch Mulford. De Palma had tire difficulties all the way through the race, which kept him back at crucial points when he had practically control of leadership.

From the start, which was a flying one, after the contestants making a circuit of the track, De Palma took the lead until the thirty-ninth mile, when he stopped for tires, and O'Donnell in his Duesenberg, who was trailing him close, pushed to the front. O'Donnell gradually increased his lead and at 60 miles was a lap ahead and at 80 miles was a lap ahead of Mulford and three laps ahead of De Palma, who had again stopped for tires. O'Donnell's lead came to a sudden end at 90 miles, when tire troubles stopped him and permitted Mulford to take the lead with De Palma only a lap behind him. At 100 miles Mulford had held the lead and carried off the $100 prize for leading at this mark, his time being 1:07:06, a speed of 88.6 m.p.h. At this point O'Donnell was two miles back and De Palma four. At 98 miles De Palma stopped for his fourth tire change.

Mulford's Tire Luck

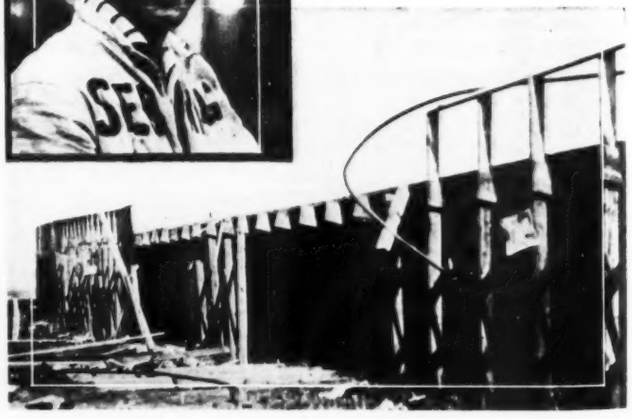
Mulford made his first stop at 105 miles for tires, but due to his lead and making a quick change he was able to maintain leadership. He succeeded in holding it until near the 200th mile, when O'Donnell took the lead due to tire troubles by Mulford. O'Donnell carried off the $100 for leading at the second century, the average being 86 m.p.h. At this point De Palma was a lap back and Mulford running in third position was four laps back. From this point De Palma gradually forged ahead, followed by Mulford. At 213 miles he was only half a lap behind O'Donnell, who was leading.

The Race Crisis

At 320 miles the crucial event happened, O'Donnell and De Palma both going to the pits together. This permitted Mulford to gain his lost laps so that when the two got back on the track, Mulford was on a par with them. From this point

Left—Joe Cooper, whose Sebring car went over the edge of the Des Moines speedway

Below—Where the car tore through the railing



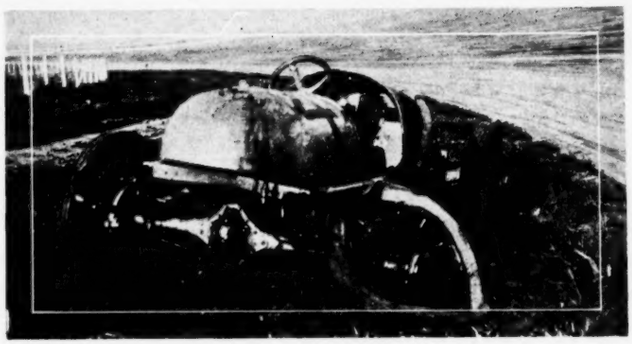
until the finish of the race there was one of the grandest struggles seen in speedway racing. For the next 50 miles O'Donnell, De Palma, and Mulford were all bunched.

Mulford Kept Out of Pits

De Palma was leading when O'Donnell's chances vanished due to his going to the pits for tires at 270 miles. This left Mulford and De Palma masters of track and road driving, to fight to the bitter end, and it was a great race between the two. De Palma held a slight lead until 289 miles, when Mulford lead him by a wheelbase. The two fought mile after mile on even terms until 294 miles, when De Palma took the lead and seemed a certain winner, barring tire troubles. Mulford was close behind and when De Palma's bad luck arrived at 297 miles, and the tire blew, it was Mulford's race.

Keeping out of the pits was what won for Mulford and going into them too often beat De Palma. Mulford made the last 100 miles without a single stop, and went to the pits only three times during the entire race. De Palma's last tire change when only 2 miles from the finish was made at lightning pace, but master effort was useless.

The other starters in the contest were not factors with the exception of Cooper, whose elimination came early. Chandler, who had fought up to fourth place with his Duesenberg at 225 miles, gave promise of being a factor at the finish, but was flagged out by fate at 239 miles. Tom Alley in the Ogren was running fifth but experienced motor difficulties. The O'Connell entry was out at the end of the eighth lap with engine trouble, and the White six entered by Shrunk went first to the pits at the thirty-second mile. Scott withdrew his



Chandler's car, which went off the track in the 240th mile at the Des Moines race

Anderson near the finish because of motor trouble. Brown took fourth place with his Duchesneau, and Barndollar was fifth in the Clergy. Henderson in the Cooling was sixth, Shrunk in the White seventh, and Alley in the Ogren eighth and last.

It was expected that trouble might arise because of the failure to properly check the scoring, but De Palma said he would not protest, although several technicalities could be raised as a basis for protest. He claims that he averaged 33 sec. for his seven tire changes at the pits and his longest stop was for gasoline and tire changes, which was 79 seconds. He says the track is all right and one of the best he had raced upon. His car was lubricated with Oilzum.

Official Time at Various Points in the 300-Mile Race on the Des Moines Speedway Aug. 7

Car	Driver	20 Miles	100 Miles	160 Miles	200 Miles	260 Miles	300 Miles
Stutz	De Palma	13:15:09	1:11:44:21	1:52:25:52	2:18:56:78	3:00:05:51	3:28:12:02
Sebring	Cooper	13:20:57					
Duesenberg	O'Donnell	13:19:68	1:08:02:52	1:49:59:95	2:16:54:22	2:59:24:51	3:31:45:51
Duesenberg	Chandler	13:55:69	1:15:16:40	2:02:30:85	2:33:49:88		
Duesenberg	Mulford	13:30:35	1:07:06:94	1:51:45:78	2:20:25:06	3:00:24:59	3:27:05:33
Ogren	Alley	14:01:39	1:15:06:52	2:00:10:68	2:29:40:77	4:21:33:27	5:10:13:08
White Spl.	Shrunk	13:57:01	1:53:54:83	2:51:02:52	3:53:07:22	4:40:33:85	5:09:54:13
Du Chesneau	Brown	15:58:75	1:22:01:55	2:12:42:59	2:49:20:93	3:51:38:91	4:26:88:18
Cooling	Henderson	14:53:36	1:28:07:27	2:24:44:25	3:06:38:75	4:24:10:50	5:01:43:25
Anderson Spl	Scott	16:58:00	1:31:19:62	3:20:04:41	3:58:28:93	4:54:22:41	
Clergy Spl.	Barndollar	17:22:15	1:34:10:00	2:28:37:68	3:05:54:75	4:03:45:18	4:40:35:02

Iowa College Automobile Course at Fair

DES MOINES, IOWA, Aug. 7—The department of engineering extension of the Iowa State College at Ames, having conducted forty successful automobile institutes in cities and towns of Iowa, has arranged to offer a course of free lectures instructing the motorist concerning the proper care and operation of his car at the State fair, to be held here the week of Aug. 27.

Mr. Leavell, the lecturer, has had several years' experience in second-hand car, garage, and service station work, and has also been connected with the engineering departments of several prominent firms engaged in the manufacture of cars and accessories.

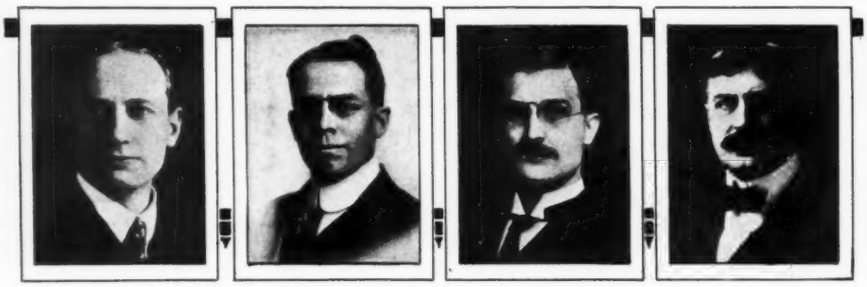
Much of the exhibit material which has been used in demonstrations throughout the State will be displayed. There will be a number of carbureters of the best known makes and models cut open to show the inside mechanism. Sections cut from damaged casings will be used to illustrate the common forms of tire abuse. There will be battery plates, pieces cut out of different types of radiators, spark plugs, and much other material of interest.

After 9 each morning Mr. Leavell will be in the automobile institute lecture room under the west end of the grandstand to answer questions relative to motor car troubles. The regular lecture will begin at 10. At the close of the lectures there will be opportunity for any one in the audience to ask questions for general discussion. During the afternoon Mr. Leavell will be available by appointment to discuss or explain individual trouble cases, and as far as possible to inspect and give advice concerning cars which are brought to within a reasonable distance of the lecture room. He will offer suggestions and advice concerning such work as the motorist should be able to perform for himself, and will point out what mechanical attention the car needs. He will not do any repair work himself. This will have to be done by those regularly engaged in such work. All of Mr. Leavell's advice and suggestions are given free.

Among the subjects which will be taken up in the lectures or will be touched upon in the general discussions at the close of the lectures are the following:

Care of Running Gear. Causes and Prevention of Spring Breakage. Spring Lubrication. Steering Gears. Alignment of Wheels. Care and Adjustment of Brakes. Types of Rear Axles. Types of Ball and Roller Bearings Used in Different Parts of the Car. Proper Lubrication and the Selection of Proper Lubricants for Different Parts of the Car, as The Engine, The Transmission, The Differential, The Wheels, The Clutch, etc. Methods of Manufacture of Oils and Greases. Radiators, Causes of Boiling, Effects of Impure Water, Anti-freeze Mixtures. Care and Attention of Electrical Starting Systems. Location of Troubles with Magneto and Battery Ignition Systems. Adjustments. Carbureters, Principle of Operation, Construction, Location and Remedy of Trouble. Fuels for Motors. Manufacture of Gasoline. Relative Merits of High and of Low Test Gasoline.

Six S. A. E. Men for Navy Committee



Howard E. Coffin, Hudson Motor Car Co. | William G. Wall, Nat. Motor Vehicle Co. | John G. Perrin, Continental Motor | A. L. Riker, Locomobile Co. of Amer.

NEW YORK CITY, Aug. 10—Of the nine members of the S. A. E. asked to accept nomination for positions on the Navy Department Advisory Committee, six have accepted and voting is now in progress for the final selection of the two representatives. The six members who have accepted nomination and whose names are now before the Society as a whole for selection are Louis S. Clarke, vice-president and consulting engineer, the Autocar Co.; Howard E. Coffin, vice-president, Hudson Motor Car Co.; A. L. Riker, vice-president and chief engineer, Locomobile Co. of America; John G. Perrin, consulting engineer, Continental Motor Mfg. Co.; William G. Wall, vice-president and chief engineer, National Motor Vehicle Co., and Rollin H. White, first vice-president of the White Co.

Car and Carbureter Design for Driving with Any Fuel

(*Continued from page* 291)

device, and it can be classified as a surface carbureter with a throttle-jet. A portion of the air supply passes, as indicated by the arrow in Fig. 19, over the fuel level in the tube *R* which connects with the float chamber. The amount of fuel entering this tube is regulated by an easily adjustable throttle valve, and the level in *R* therefore becomes high when the motor is resting, making starting easy, while the level drops when the speed is increased, so that then more air is drawn in. As said, it is only a portion of the air which passes over *R*, the main intake being at *H*. The charged air strikes the large metal cone *M* which is the organ for closing and regulation of the carbureter. When the motor is shut down this cone comes to rest against a large metallic surface and is thereby kept warm, so as to assist in starting after any brief rest period.

The air channel *G* does not lead to the atmosphere, as Fig. 19 would suggest, but branches into two pipes, 1 and 2 in Fig. 20, the first one leading to the lower portion of the carbureter and the second through the top of the float chamber. The channel *G* also has a fresh air inlet at *l*, though only in the vertical model, the Lyma being manufactured in both vertical and horizontal models, like the Zenith.

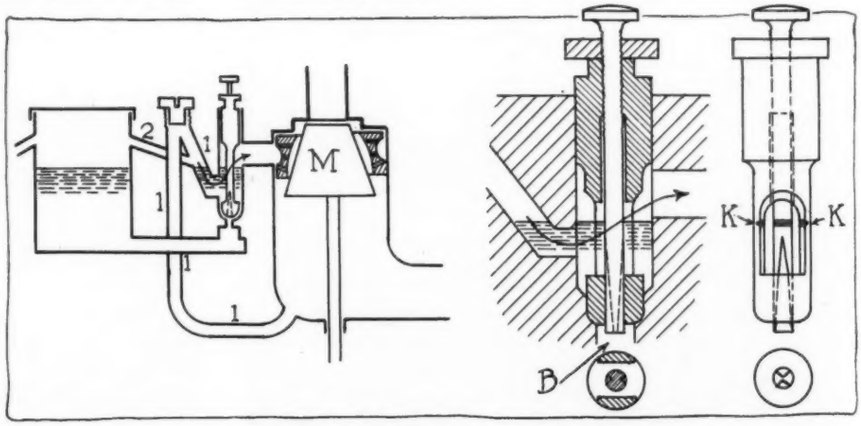
In reality the pipes have not as simple a course as shown in Fig. 20. Channel 1 does not dip downward at once but is first sent upward as in Fig. 21, with the object of forcing the air to bubble through the fuel so long as this stands high—for starting and at low speeds.

In the horizontal Lyma there is an additional organ, consisting in a ring-shaped body (shown hatched in Fig. 21) with a number of narrow passages through which the gas mixture must flow before it strikes the cone *M*.

The organ for throttling the fuel, which is sketched into Fig. 21 and shown in detail in Fig. 22, is easily removable, being held in position only by a spring in the same manner as the float chamber cover is now in many carbureters held down only by a spring and a catch. The double-hatched part is held down by such a spring, so as to make its lower spherical surface form a tight joint against the fuel entering at *B*, Fig. 22. The fuel rises, however, through tapered slits in the spindle of the organ, and if this spindle is raised or lowered—by thread and locknut—the slits give a larger or a more restricted channel for the admission of the fuel. When the adjustment has been found at which the motor works best, a slight notch is filed at one point—such as *KK* in Fig. 22—so as to make it easy to find this most favorable position again after the spindle has been removed for cleaning of a possibly clogged slit.

The Lyma carbureter has also an arrangement for introducing fresh air in the cylinders during coasting, but the channel provided is much too narrow. Another device for automatic adjustment of a slide to proportion heated and cold air is probably also of small value, as it is not found in the horizontal model. The greatest merit in Lyma design is the provision for adjusting the float to the fuel gravity.

[Von Löw concludes with the statement that he will not return to gasoline after the war and the prediction that others who do so, rather than arranging to use all fuels, will be disappointed].



Figs. 21, 22—Details of Lyma carbureter

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Cantilevers Come Slowly

NOW that so many new models are announced it is obvious that European history will repeat itself in America with respect to cantilever springs. In both hemispheres the cantilever spring is an old idea and it has been used for many years. But for no very apparent cause a sudden wave of enthusiasm for it appeared in Europe between two and three years ago and this has been followed by a similar wave in America. At the S. A. E. meeting in New York last January, everyone was talking cantilever springs, and the wildest sorts of claims for them were to be heard, yet we now see that only quite a few of the new cars are being fitted with anything novel in the way of suspension.

Presumably the truth is that the cantilever spring has been tried out extensively and has shown peculiar adaptability to certain chassis while proving a difficult problem on others. As a spring it may be good or bad just as any other sort of spring can be, but there is now a fairly prevalent idea that a good cantilever spring layout is decidedly more costly than a semi-elliptic or three-quarter design.

It is highly satisfactory that there has been no rush to use the type until its good and bad points were discovered, and the present situation suggests that its popularity will now increase in proper proportion to its merits without any spurious advantages being claimed for it.

Industrial News Service

IT is a matter of regret that an ancient and honorable contemporary, in the curtailment of its activities, should belittle the sphere of usefulness of the entire industrial press, to bolster its change of policy. It openly directs the automobile industry to the daily press for the news of the industry. In so doing it ignores the foundation principle of industrial journalism. We appreciate the usefulness of the daily press on general topics, but in an age of specialists no individual or organization can specialize on everything. The business man, therefore, depends on the daily press for the great sensational events of the day, and on the industrial press for an accurate record of the developments of the industry with which he is associated. Whether these facts are needed daily, weekly, monthly or yearly depends on the reader's activity, but in the automobile field we have no confidence in a constituency satisfied with a mortuary news service when every opportunity exists for authentic weekly information.

The automobile industry in exceeding its most sanguine expectations has established new records for industrial development; each week is punctuated with some salient event, and the automobile press owes it to the industry to accurately record such, not in a cursory manner, but with authentic details. The daily press, aware of these facilities, looks to the business press for authentic records of development, knowing as it does its impressions are furnished by those not familiar with the warp and woof of the industry.

We are, however, pleased to see our contemporary waking up to the facts of specialized journalism, and devoting one issue to the engineer and the other to the dealer. This will probably result in two separate and distinct monthly issues, which follows our conception of separate publications for consumer, dealer and manufacturer, instead of the blanket sheet idea.

Just how much will be lacking in this elimination of industrial news service and what influence this will have on the character of the circulation satisfied with this deficiency will be of special interest.

The Return of the Worm

NOT so long ago these was vivid interest in American automobile engineering circles regarding the use of worm drive for pleasure cars, and there were many who thought the worm would come. Then the spiral-type bevel made its appearance and the wave of interest largely died. What, however, it is now being asked, is the probable effect of the low gear ratios now so usual, and there are many who are again looking to the possible coming of the worm.

One of the disadvantages of the worm-driven axle is the fact that it must have a rather large center case and so give clearance trouble either beneath the axle or above, according to whether the under or over position is chosen. But with bevel ratio of 5 to 1, the clearance difficulty is coming up again and the worm is little, if any, worse for the same reduction.

Earl Overland Vice-President

—

Leaves Hendee Mfg. Co.—To Assume Duties Oct. 1—Is a Director

TOLEDO, OHIO, Aug 9—C. A. Earl, vice-president and general manager of the Hendee Mfg. Co., Springfield, Mass., has resigned to become vice-president and director of the Willys-Overland Co., this city. He will assume his duties Oct. 1. For over twenty years Mr. Earl was with the Corbin Screw Corp., New Britain, Conn., and after it became a unit in the American Hardware Corp. he became first vice-president of the latter. He resigned this position and that of general manager of the Corbin business last year to become vice-president and assistant general manager of the Hendee company.

His experience has been such that he is not only a manufacturing executive, capable of organizing and directing a factory on lines of maximum efficiency, but he is an experienced director of sales policies and organizations, and at the same time enjoys a high place in the esteem of Boston and New York banking houses, who have reason to know his capacity in large financial matters.

—

Overland Declares a 48-Hour Week

TOLEDO, OHIO, Aug. 6—Forty-eight hours will constitute a week's work for the 20,050 Willys-Overland factory employees after Nov. 1.

Though the regular working hours of all employees will be reduced from fifty to forty-eight hours a week, no reductions in daily or weekly pay are to be made. The reduction of working hours without corresponding decrease in pay is equivalent to a raise in pay proportionate with the reduction of hours of labor for all employees.

Under the new time and rate schedules time and one-half will be paid for all overtime and double time will be paid for services on Sundays and holidays.

The move follows an increase of 5 per cent in wages granted about six weeks ago.

It is announced that night and overtime forces will not be reduced so long as the demand for Overland cars keeps so far ahead of the factory's production.

—

Locomobile Adopts 8-Hour Day

BRIDGEPORT, CONN., Aug. 9—Acceding to the demand of the machinists working for the Locomobile Co. of America here, president S. T. Davis today conferred with a delegation of employees and conceded an 8 hr. day, thus avoiding what might have been a serious tie-up of the plant which is now being rushed to capacity on large orders for motor trucks from abroad. The question of wages for this working schedule will be taken up at a board of directors meeting to-morrow. Mr. Davis will report to the committee next Thursday. The men demand the same rates for an 8 hr. day as formerly received for a 10 hr. day. Previously they had rejected a bonus proposition made to them by the Locomobile officials.

—

Lyons Atlas Discontinues Cars

NEW YORK CITY, Aug. 11—The Lyons Atlas Co., Indianapolis, Ind., manufacturer of the Lyons-Knight motor car, it is believed will temporarily discontinue the manufacture of automobiles, and confine its activities to the manufacture of engines and parts for the automobile industry. Some change in manufacturing policy of this nature has been trade rumor in the Hoosier capital for some time. The general impression is that while present plans are to cease manufacture for the time being, there is a possibility that the company may reconsider manufacturing at a later date. The company's new test cars are still undergoing road tests, but some of the automobile experts in connection with the factory have been released from their duties.

The Lyons Atlas Co. for years manufactured poppet valve types of motors for the trade, and over 3 years ago announced the manufacture of the Knight sleeve-valve motor for general use. Soon after this, the company decided to manufacture cars fitted with this motor, which policy has been continued up to the present.

—

Bosch Has 8-Hour Day

PLAINFIELD, N. J., Aug. 7—The Bosch Magneto Co., the largest of the nine Plainfield factories, in which the machinists have threatened to strike, announced to-day that it had granted the demand for an eight-hour day. This is acceptable to the men.

—

Vacuum Oil Raises Wages

BAYONNE, N. J., Aug. 7—Officials of the Vacuum Oil Co. have announced an increase of wages for the 800 employees to take effect at once. Those receiving less than $2.50 a day are to get an increase of 10 per cent and those receiving $2.50 or more are to be given 25 cents a day more.

—

Gasoline Advanced 1 Cent

OKLAHOMA CITY, OKLA., Aug. 10—The Pierce Oil Corp. advanced the price of gasoline 1 cent for its distributing stations throughout the State.

Sun Six Details Announced

—

L-Head 3 by 5 Power Plant—Touring Car and Roadster —Territory Assigned

BUFFALO, N. Y., Aug. 9—Specifications of the Sun light six which is now being manufactured in this city and three test products of which will soon start on a transcontinental run have just been made public. The motor is an L-head six, 3 by 5, designed to develop 50 hp. on the block. It is a unit casting, including both intake and hot-air connections, giving a clean exterior. The reciprocating parts have been lightened and the motor is primarily a high-speed design. The clutch is a three-plate dry disk and mounted, with the gearset, in unit power plant form with the motor. Gasoline feed is by the Stewart vacuum system.

The three-speed gearset has its mainshaft mounted on annular bearings with the countershaft on plain bearings. The rear axle is three-quarter floating and is carried on ball and roller bearings. The housing is of pressed steel and carries the 3¼ by 52-in. semi-elliptic rear spring, which is used in connection with Hotchkiss type drive. The spring is designed to be approximately flat under load. The frame is of channel section 4½ in. deep and 42 in. wide in the rear tapering to 28 in. in the front width. The wheelbase is 116 in. and the tread 56 in., with an option of 60 in. if desired.

The body designs are two in number, a five-passenger streamline type or a two-passenger roadster. The equipment includes Remy or Westinghouse starting, lighting and ignition, with single units wired on a single system. The color is Brewster green, and although the price is not yet announced, it is given out that it would be less than $1,000.

Sales Managers Appointed

Territorial divisions have been made and the sales managers and their territories so far assigned are: C. H. Davies for Ohio and Pennsylvania; G. A. Coats, for Michigan, Iowa and northern Illinois; J. E. Newell for Arkansas, Mississippi, Louisiana, southern Illinois, eastern Missouri and parts of Indiana, Kentucky and Tennessee; G. A. Jones for Kansas, Oklahoma, Texas and western Missouri; A. L. Dixon for New York and Vermont, with the exception of New York City.

The officers of the company are: R. Crawford, who was formerly sales and advertising manager of the Haynes company, is now vice-president of the new concern; R. C. Hoffman, who has been wih Case, General Motors, Amplex and Haynes, is engineer and production manager.

Automobile Exports $68,107,818

Total for Fiscal Year Doubles 1914—June Increase Is Sixfold

	1914 to June 30. No.	Value	1915 to June 30. No.	Value
Cars	28,306	$25,392,963	23,880	$21,113,953
Trucks	784	1,181,611	13,996	39,140,682
Parts	....	6,624,232	....	7,853,183
		$33,198,806		$68,107,818

	June, 1914. No.	Value	June, 1915. No.	Value
Cars	1,982	$1,870,882	4,418	$4,785,998
Trucks	90	120,257	2,990	8,578,802
Parts	....	473,968	....	1,139,182
		$2,465,107		$14,503,982

WASHINGTON, D. C., Aug. 11—Exports of automobiles and motor trucks have reached a total in the year ending June, 1915, far in excess of any previous 12 months. They totalled $60,254,635, made up of motor trucks to the value of $39,-140,682 and automobiles valued at $21,-113,953. This value represented 37,876 vehicles made up of 13,996 motor trucks and 23,880 passenger cars. To this can be aded parts to the value of $7,853,183, giving a total of $68,107,818.

Trucks Gain Eighteenfold

When these figures covering the year are compared with the previous year, namely that ending June 30, 1914, the increase becomes apparent. During the year ending June 30, 1914, the total value of automobiles and trucks was $26,574,-574, showing that exports have more than doubled during the past year, the war conditions being entirely responsible for this. In the fiscal year ending June, 1914, only 784 motor trucks were exported as compared with 13,996 during the past year; in other words, the truck exports have increased eighteen fold during the year.

The war has not had such a favorable effect on the export of passenger cars, which has decreased during the past year from 28,306 to 23,880, a net decrease of 4426 machines. This is explained by the fact that the demand for passenger vehicles during the early part of the war year was not great. The total value of the 784 trucks was $1,181,611; and the value of the 28,306 passenger cars $25,-392,963.

Sixfold Increase for June

The export figures for June, 1915, shows 2990 motor trucks valued at $8,-572,802, and the export of passenger cars 4418, valued at $4,785,998. During June, 1915, the exports of automobile parts, not including engines and tires, amounted to $1,139,182.

Contrasting the business in June, 1915, with June, 1914, great export gains are noticed all along. June, 1914, recorded 90 motor trucks exported at a value of $120,257, in other words the exportation of motor trucks was thirty-three times greater in June, 1915, than June a year ago.

In June, 1914, 1982 passenger automobiles were exported, valued at $1,870,-882; where as in June, 1915, there were 4418 automobiles exported, valued at $4,785,998.

—

Monitor Eight and Four at $1,075 and $795

COLUMBUS, OHIO, Aug 9—Two cars, an eight and a four, have been put out by the Cummins Auto Sales Co., under the names of the Monitor 8 and the Monitor 4-30. The eight is listed at $1,075 and the four-thirty at $795, both f.o.b. Columbus, Ohio.

The motor of the eight is a Golden, Belknap & Swartz unit with its cylinders cast in two blocks at 90 deg., and having 2¾ by ½ dimensions. The heads are removable from this motor, as is also the bottom of the crankcase. This motor has a single camshaft and is oiled by a combined pressure and splash system. The drive is through a multiple disk clutch to a three-speed selective gearset, then through a driveshaft fitted with two Spicer universal joints to a Timken rear axle. The wheels are artillery type, with 33 by 4 tires, and the springs three-quarter elliptic. The body is a five-passenger design equipped with a mohair top and jitney jiffy curtains. The equipment is complete, including Stewart speedometer, double ventilating windshield, a complete set of tools, robe and foot rails and tire carrier. Gasoline feed is by the Stewart vacuum system.

The Monitor 4-30 has its four-cylinder L-head 3¾ by 4¼ motor cast in a block. It has a unit power plant with three-point suspension, including a multiple-disk clutch, three-speed gearset and center control units. The drive is by shaft, the propulsion being taken through a torsion tube. The rear axle is floating and the wheels 32 by 3½. The gasoline tank is carried in the cowl and has a capacity of 10 gal. The wheelbase of this car is 108 in., being 4 in. shorter than the eight. Electric lighting and starting is included on both these cars.

—

Church Packard Assistant Chief Engineer

DETROIT, MICH., Aug. 6—H. D. Church has been appointed assistant chief engineer of the Packard Motor Car Co. Mr. Church joined that company six years ago and for the last five years has held the title of truck engineer. H. T. Woolson, who has been chief engineer of the Gas Engine & Power Co., Morris Heights, N. J., succeeds Mr. Church as truck engineer.

Budlong Resigns from Packard

Becomes Vice-President of Gaston, Williams & Wigmore

NEW YORK CITY, Aug. 11—Milton J. Budlong, president of the Packard Motor Car Co. of New York, Chicago and Philadelphia, has resigned to become vice-president of the importing and exporting firm of Gaston, Williams & Wigmore, Inc., of 140 Broadway, this city. He has been with the Packard company 7½ years.

He will be succeeded as president of the Packard Motor Car Co. of New York by E. B. Jackson, manager of the Philadelphia company, who will retain the general supervision of that organization. H. M. Allison, who for years has been manager of the Packard Motor Car Co. of Chicago, will follow Mr. Budlong as its president.

Mr. Budlong entered the automobile industry about 12 years ago, when he became secretary and treasurer of the Siemens & Halsky Electric Co. of Chicago, which was then controlled by the Electric Vehicle Co., Hartford, Conn. He later became president of the Hartford company, where he remained about 3½ years. During the Selden litigation, Mr. Budlong became general manager of the Association of Licensed Automobile Manufacturers, remaining in this capacity for about 8 months. In 1908 he joined the Packard company.

—

New Mack Models Coming

NEW YORK CITY, Aug. 10—The International Motor Co. is preparing a new line of heavy chain-driven Mack trucks which it is expected will not be ready before Jan. 1. These vehicles have been undergoing very thorough tests in actual service, one of them being in use at the National Guard maneuvers at Plattsburg, N. Y. at the present time.

The International Motor Co. is increasing its export trade through the efforts of its export department, located in a separate office in New York City in charge of W. T. Stevens, who is sending representatives into Africa, South America, India, China, Japan, Australia and other points in Oceania.

It marks the introduction of the Renault type of hood with this concern, the radiator being incorporated in the dash. The radiator is new, being of the French Solex type, a circular type design. A particularly neat designing job has been done with aluminum dash cowl. The cab is steel. The truck uses an improved four-cylinder motor, amidship gearbox and double chain drive.

Scarcity of Parts Serious

Truck Makers Cannot Secure Enough—Foreign Buyers Growing Factor in Trade

NEW YORK CITY, Aug. 11—The unprecedented demand for component parts of automobiles has been the dominant factor in the industry during the past week. Many makers have been held up in deliveries by failure to get some necessary part in sufficient quantities. It is not unusual for automobile passenger car makers to have a corps of road men who constantly are drumming up quicker deliveries from parts makers and who search broadcast for additional supplies in times of exigencies. This condition has invaded the motor truck field and now not a few truck makers have had to resort to the same methods of securing component parts, a most unusual situation in this field.

Big Foreign Demand

The scarcity of parts is undoubtedly due to the increased demand from foreign countries. During the past week, several jobbers from England have been in Detroit, Cleveland, Toledo, and other centers, and inquiries by mail have arrived on every steamer. One representative from France has been making the rounds during the past week. The British trade has never been in a more flourishing state so far as sales are concerned than at present, and automobiles are sold in England much faster than they can be shipped. Owing to the increased domestic demand these foreigners are finding great difficulty in obtaining cars of any kind. There is some talk among them of buying up stocks of used cars so difficult do they find it to get new cars.

A very important stage in the development of the American industry is shown by the anxiety of foreign interests to purchase motors, axles, gearsets, steering gears, etc., for assembly abroad, the feeling being that once this method of manufacture is started abroad it will continue. Parts makers are appreciating this and doing all they can to accept orders for small quantities.

Big Wheat Crop

The home trade, so far as can be learned from the distributing centers, has continued to hold throughout the vast agricultural territory, excepting where there is an immediate lull due to harvesting conditions. Continued rains add a more serious aspect to conditions. The oat crop has suffered very seriously during the past week in several States. Severe storms have injured the corn crop, but the bumper wheat crop, which promises to be the greatest in the history of the country, is looked to to carry the average, in spite of adverse weather conditions.

In engineering circles, the idea is gaining strength that the V-type of motor in eight and twelve-cylinder designs will largely displace the six-cylinder next year, so great is the demand for them and so small the trouble connected with them to date. Several of the expansions and additions to factories are rapidly getting into shape to produce these types.

Conditions in the Southwest, including New Mexico, give promise of increased business, the favorable situation in mining and other industries indicating such. For the first 7 months of this year 4230 automobile licenses were issued by Secretary of State of New Mexico, this representing a gain of 60 per cent over the corresponding period of a year ago. It is believed the percentage of increase this fall will be much larger when farmers and others begin realizing on their season's work. The greatest increase in registration and demand comes from the rural districts.

—

Cars Scarce in West—Harvesting Hay and Rye

MINNEAPOLIS, MINN., Aug. 7—The automobile business of last week in the Twin Cities was exceptionally good, considering several factors which worked against the trade. One was that farmers in Northwestern States have begun to harvest hay and rye. It is more important to the farmer and to the automobile dealer that he turn his attention just now to getting the crops in. Successful crops will pay in the fall.

Another factor was continued inability by many agencies and distributers to get cars enough to fill orders. Farmers and agents sit around the agency offices and the factory branches and refuse to move until they get cars. If three freight car loads come in, they are all gone in a trice, driven off by the waiting line.

Still another trouble was wet weather. After a long summer of cool and rainy weather the resumption by the rain god last week made roads worse, so that prospects could not get in, and somewhat dampened the ardor of other probable buyers, who turned their thoughts to something else for the time being.

The delay caused by waiting for 1916 model announcements has been overcome, according to Minneapolis dealers.

—

Signal Co. Changes Name

DETROIT, MICH., Aug. 5—The De Weese Auto Safety Signal Co. has changed its name to that of Auto Safety Signal Co. and has increased its capital stock from $1,500 to $20,000.

N. Y. Sales Ahead of 1914

Dealers Report Continued Good Business—Bad Weather Affected Some

NEW YORK CITY, Aug. 10—The local automobile dealers report large sales during the last two weeks. The inclement weather last week in some cases pulled down the sales records, but taking the last week in July and the first week in August together, the dealers report larger sales for that period than for the same one in 1914.

Reports from Dealers

The Saxon company up to Aug. 10, sold between 1500 and 2000. Sales last week were fair. Shipments are coming in fast from the factory. A large percentage of the sales are on the six cylinder car. The company is doing a large business in Long Island, which shows a 300 per cent increase.

The Oldsmobile company has sold all its cars and reports that if it had more cars it could sell them. Shipments are slow.

Mercer sales in July were two and one-half times greater than those in the corresponding month in 1914. Sales up to Aug. 10 are greater than those for the whole month of August in 1914.

There is only one Stutz car on the floor. Sales during the past ten days have been unusually good. Even all the second-hand cars are sold.

Hudson sales are 300 per cent better. Up to May 4, the agency sold 580 cars. During June the sales were 274, July 241, and up to Aug. 9, fifty-six cars have been sold.

All Franklin cars are sold. The firm is twenty-one cars behind in retail orders. Lozier reports good sales. Shipments are coming in regularly. Interstate sales are double those of 1914. Last week the rain slowed up the sales, but during the last few days they picked up. Not a car on the Packard floor. Marmon is all sold out, having only a demonstrator left.

—

Automobile Liability Rates Cut in N. J.

NEW YORK CITY, Aug. 10—The automobile liability rates have been cut in New Jersey by the New Jersey Fidelity & Plate Glass Insurance Co. The rates are $6.50 added to the insurable horsepower for cars from 16 to 30 hp., or $1 to $14 under the conference companies' tariff rates, and all cars above 30 hp. are $14 below the conference tariff. The above company has applied to New York State for permission to write automobile liability and property damage.

S. A. E. Suggests Standard Names

Names of Parts Adopted at Recent Meeting—List Open for Criticism

DETROIT, MICH., Aug. 9—The suggested names for parts which have been adopted at the meeting of the nomenclature division of the standards committee of the Society of Automobile Engineers have now been announced and the committee is seeking criticism before final acceptance of the terms included. The nomenclature suggested is as follows:

Front—toward forward end of car. Rear—toward rear end of car. (Confusion only likely in regard to dash.) Where parts are numbered, No. 1 should be toward the front of the car. For instance, No. 1 cylinder is the one nearest the radiator (in conventional construction). (Note—Should valves be numbered 1 E, 1 I, 2 I, 2 E, etc., or should they be numbered 1, 2, 3, regardless of cylinder numbers?) Right is to the right hand when sitting in one of the seats of the car. Left—corresponding. Cylinders of V type engines should be numbered 1 R, 1 L, 2 R, etc. Studs, screws and bolts shall take names from parts which they serve to hold in place, although they are assembled with other parts, e. g., cylinder stud is permanently screwed into crankcase but holds the cylinder in place.

Group 1: The name "engine" should be used rather than "motor" to avoid confusion with electric motors and secure lower freight rate. Cylinder. Cast in block—not cast en bloc. Inlet valve cap. Exhaust valve cap. Valve cap gasket. Cylinder head. Cylinder head gasket. Cylinder head plug. Water jacket top cover. Water jacket top cover gasket. Engine water outlet. Engine water inlet. Water jacket side (or front or rear) cover. Valve spring cover. Valve spring cover gasket. Valve spring cover stud. Valve stem guide. Spark plug. Priming cup. L-, T-, I-, F-head cylinders—L-head, valves on one side of cylinder; T-head, valves on opposite side of cylinder; I-head, valves in cylinder head; F-head, one valve in head, other on side.

Group 2: Crankcase (one word). Barrel type crankcase. Split type crankcase (indicating the type which is split horizontally at or near center line of crankshaft). Crankcase upper half. Crankcase lower half (only to be used when the lower half contains bearings). Oil pan (used for lower part of split type or barrel type crankcase, whether this serves as an oil reservoir or not). Oil pan gasket. "Bushing" instead of "bearing" for the removable and renewable lining used in a plain bearing. Crankshaft front bearing bushing (upper half and lower half). Crankshaft front bearing cap. Crankshaft front bushing support (sometimes used in barrel type crankcase). Crankshaft rear bearing bushing. Crankshaft rear (etc.) bearing shims. Crankshaft center bearing bushing (if only three bearings or if all except end bearings are alike). Crankshaft second bearing bushing, etc. (if more than three bearings, e. g., front bearing, second bearing, third bearing, fourth bearing, rear bearing). Hand hole cover. Hand hole cover gasket. Timing gear cover. Timing gear cover gasket. Flywheel housing. Generator bracket, etc.

Group 3: Crankshaft. Flywheel. Crankshaft timing gear (or sprocket). Crankshaft timing gear key. Flywheel starter gear. Crankshaft starter sprocket. Flywheel studs. Clutch spring stud. Crankshaft starting jaw (or pin).

Group 4: Camshaft. Eccentric shaft (Knight engine). Camshaft timing gear. Camshaft timing gear key. Camshaft idler gear. Camshaft oil pump gear. Camshaft ignition distributor gear.

Group 5: Connecting-rod (hyphen saves telegraph tolls). Straight connecting-rod—Forked connecting-rod (V type engine). Connecting-rod cap. Connecting-rod bushing, upper half (lower half). Connecting-rod cap stud (or bolt). Connecting-rod cap nut. Connecting-rod bearing shims. Connecting-rod dipper. Piston pin lock screw (in connecting rod or piston). Piston pin. Piston pin bushing. Piston. Piston ring. Piston ring groove.

Group 6: Valve lifter. Valve lifter guide. Valve lifter guide clamp. Valve lifter roller. Valve lifter roller pin. Valve adjusting screw. Valve roller pin. Valve rocker (either at cam or at overhead valve—if both, upper and lower). Valve push rod (intermediate between lifter and valve—I-head engine). Valve adjusting screw. Exhaust valve. Inlet valve. Poppet valve. Valve spring. Valve spring retainer. Valve spring retainer lock.

Group 7-8-9: Water pump. Water pump impeller. Water pump impeller key. Water pump body (in case of doubt, body is member mounted on engine). Water pump cover. Water pump shaft. Water pump gland. (The part which contacts with the packing, whether threaded or not). Water pump gland nut (or screw, etc., where these parts are used to compress gland). Water pump shaft gear. Magneto (or generator) coupling, pump end. Magneto coupling, center member. Magneto coupling, magneto end. Tire pump driving gear. Tire pump shaft gear. Tire pump. Tire pump idler gear. Generator gear. Generator shaft. Generator coupling (members as above). Starter-generator. Gasoline pressure pump (power pump). Gasoline hand pump.

Group 10: Oil pump. Oil pump body (any type of pump). Oil pump plunger. Oil pump plunger spring. Oil pump inlet valve. Oil pump outlet valve. Oil pump shaft. Oil pump shaft gear (outside pump). Oil pumping shaft gear (inside pump). Oil pumping follower gear. Oil pump cover.

Group 11: Starting crank jaw. Starting crank shaft. Starting crank. Starting crank handle. Starting crank handle pin.

Group 12: Fan. Stationary fan support. Adjustable fan support. Fan hub. Fan blades. Fan pulley. Fan belt. Fan driving pulley.

Group 13: Inlet manifold (more than one connection to cylinder). Inlet pipe (only one connection to cylinder). Inlet manifold or pipe gaskets (at cylinders). Carburetor gasket.

Group 14: Exhaust manifold. Exhaust manifold gaskets.

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$300,000 Addition for Fisk

CHICOPEE FALLS, MASS., Aug. 6—The Fisk Rubber Co. will erect a $300,000 brick and steel mill building on its new property at Oak and Grove streets, in addition to the three buildings now under construction there. The new building will be located on the property recently acquired by the company between the six-story warehouse now in process of erection and the Boston & Maine railroad track. Employment will be furnished for 3000 additional persons. The building will be five stories, with a basement 600 ft. long and 110 ft. wide.

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Croxton Plant Sold to Washington Tire & Rubber Co.

WASHINGTON, PA., Aug. 7—The sale of the plant of the Croxton Motor Car Co. in the west end of the town to C. J. Davis of East Palestine, Ohio, who represents the Washington Tire & Rubber Co., tire maker, was completed yesterday. It is stated that the plant will start working before Dec. 1. About 150 men will be employed at the beginning, that number being increased later to 350. Mr. Davis will have charge of the Washington plant.

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Pennsylvania Registrations $1,483,201

HARRISBURG, PA., Aug. 7—The receipts of the automobile division of the Pennsylvania State highway department for the first six months in 1915 show that $1,483,201 had been received. These receipts are the more remarkable when it is considered that on the first of July, 1912, the total receipts of the automobile division were $519,000.

Stewart Pump Supplies Cool Air

Tests Made at Armour Institute Show that Air at Tire Is at Atmospheric Temperature

CHICAGO, ILL., Aug. 9—In order to prove its contention that the statements contained in a paper presented by Paul W. Litchfield at the recent meeting of the Society of Automobile Engineers are not accurate as regards the air temperature due to the heat imparted by power pumps, the Stewart Warner Speedometer Corp. has had a series of tests made by Professor Roesch at the Armour Institute of Technology, Chicago.

The tests which were made on the Stewart motor driven pump show that the air enters the tire at virtually the same temperature as that of the outside, and furthermore, the fact is brought out that the air from a hand pump is from 30 to 40 deg. higher in temperature than the outside air. The tests were made with the Stewart pump inflating a 37 by 5 tire.

The temperature of the air was taken at three points simultaneously.

STEWART TIRE PUMP TEST

Room temperature..... 71 deg. Fahr.
Average r.p.m. of pump.....735 deg. Fahr.

Line pressure, lb. per sq. in. gage	Degrees Fahr. Temp. of air in pump	Temp. of air passing cooling coil	Temp. of air entering tire
0.00	71	71	71.0
30.25	110	76	72.0
41.00	129	84	71.5
48.00	152	88	71.0
58.25	168	94	70.5
64.00	188	98	70.0
70.00	202	103	69.5
76.00	214	107	70.0
83.00	225	110	70.0
88.00	232	114	70.0
94.00	240	116	69.5
101.00	248	117	69.0

One of the remarkable findings of this test was that the air entered the tire 2 deg. cooler than the outside air.

FOOT PUMP TEST.

Hose—24 in. of rubber hose regularly supplied with pump to gage.
Room temperature—72 deg. Fahr.

Line pressure, lb. per sq. in. gage	Temperature (degrees Fahr.) of air as it enters pump
0.00	72
25.00	74
28.50	76
36.00	78
47.00	80
55.00	82
60.25	85
66.00	87
74.00	89
79.00	92
88.00	96
93.00	99
101.00	103

The total number of strokes required with the hand pump to reach the pressure of 104 lb. was 598. It will be noted Mr. Litchfield said that, with a hand pump, there would be no particular increase of temperature, because a hand pump works so slowly. This test showed a rise of 31 deg. hotter than the outside air, due, of course, to the short length of hose connection that is furnished with hand pumps.

English Ford Sells 12,500 Cars

War Has Not Affected English Business, Which Shows 50 Per Cent Increase

NEW YORK CITY, Aug. 8—That the war has not affected the Ford company's business in England and that its 1915 output was almost 50 per cent better than in 1914, were a few interesting points brought out in an interview with P. L. D. Perry, managing director of the Ford Motor Co., Ltd., of England, who arrived in this city to-day on the St. Paul. He will make his annual business trip to Detroit. Henry Ford, together with his son, Edsil B. Ford, Frank Klingersmith, the director of the plant, and Frank Mayo, chief engineer, met Perry at the pier.

Mr. Perry denied the report that the company had received large war contracts. The company, however, is making about 15,000 cars for the British Government for use as motor ambulances.

As stated above the war has not affected the English company's business and the concern does not expect a boom after peace is declared because its factories are running at full pressure all the year round.

Mr. Perry said that the Ford factory at Manchester, England, employed 1600 hands and paid 50 per cent higher wages, grade for grade, than any other automobile concern over there.

Up to Aug. 1 this year, the company sold 12,500 cars and had 8500 on order, which included 600 ambulances that were sold to the government. The output was almost a 50 per cent increase over 1914. The engines and axles are made at Detroit and the other parts including the bodies, are made at Manchester.

The British Government sends 100 soldiers from the Army Transport Service to the Ford works for two weeks at a time to learn how to repair machines in the field and how to put them together.

The $440 car sold in the United States costs $575 in England, the extra charge being made to cover the cost of packing, insurance and transportation.

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Britons Would Protect Motor Trade

LONDON, ENGLAND, Aug. 6—Protection against the American invasion of British motor vehicle markets is being sought by British motor vehicle manufacturers. Appeals have been made to members of parliament for either the prohibition of imports of motor vehicles or the imposition of a high import duty. They point out that owing to the absorption of the greater part of the motor output of England by the government they are unable to meet American competition; on the other hand, it is pointed out by the importers of American vehicles that British makers are now earning more than ever through war contracts and that while they are losing domestic trade to American builders their plants are running at forced draft and they are selling to a market which costs very little to secure.

British merchants who have had both motor vehicles and horses taken from them by the government are forced to adopt American vehicles to carry on commerce. The real status of the matter seems to be that British makers fear that having once used American trucks English merchants and tradesmen may continue to buy them thereafter, even though home supplies are again made available.

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Ford Inventory Complete—18,500 Men Resume Work

DETROIT, MICH., Aug. 9—After having been laid off several weeks pending the taking of the annual inventory, the Ford Motor Co. resumed normal activities today when between 18,500 and 19,000 men returned to work. This return to activities of the Ford company has a far-reaching effect upon many other plants or factories which are largely working for the Ford company only. At the C. R. Wilson Body Co. it was stated that the number of men which make up the Ford department is 300 to 350 from a total force of 1300 to 1400. At the Herbert plant the force to be taken back to-day is estimated at 700 out of a normal force of 800 to 850. At both of these concerns the Ford departments will turn out touring car bodies exclusively, and both are to turn out a much larger quantity than during the past fiscal year.

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Gramm-Bernstein Has 1,250 Foreign Truck Orders

LIMA, OHIO, Aug. 9—S. A. Gramm, vice-president and general manager of the Gramm-Bernstein Co., Lima, is authority for the statement that orders for 1,250 motor trucks are on the books of the company at this time and that considerable additonal business had to be turned down because of lack of capacity. That is being remedied, however, and additions and extensions are under way which will be completed in October of this year which will largely increase the capacity.

The company has already shipped 300 motor trucks to foreign countries, such as France, Roumania, India and Russia. A large proportion of the orders now on the books are from foreign nations.

The company is now shipping trucks at the rate of 150 per month, and when the machinery is installed in the new additions the number will be increased to 250.

Harvard Roadster for $750

Pioneer Motor Car Co. of Troy Brings Out 2¾ by 4½ L-Head Four

TROY, N. Y., Aug 7—The Pioneer Motor Car Co. of this city is putting on the market a car known as the Harvard, which is in roadster form and fully equipped for $750. This car is designed to fit in with the present tendency toward small luxuriously fitted cars which will be economical as regards upkeep and at the same time furnish the comfort found in larger cars. The power plant is a 2¾ by 4½ Model motor with the four L-head cylinders cast in a block and having the intake and exhaust manifold integral. Some of the specifications of the car include 1⅛-in. valve, Carter carbureter, Bosch ignition, left or right drive optional, electric lighting and starting, unit power plant type, three-speed gearset, semi-floating rear axle, quarter-elliptic springs, 28 by 3-in. wire or wood wheels, wheelbase 100 in. The body is of sheet steel, aluminum and wood, with linoleum running boards bound with aluminum. Storage space is provided under the seat and also under the rear deck. The standard color is maroon, with black running gear.

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Parts Export Demand Coming

LONDON, ENGLAND, Aug. 5—That American parts makers and manufacturers of complete vehicles should prepare now for the demand for motor truck parts which will follow the large sales of American vehicles abroad is the advice of a European army officer recently given. Besides the demand on the part of owners of American Motor trucks abroad there is every indication that the increased demand for motor trucks which is expected to follow the war due to reconstruction work to be done and to the construction of former transport means that European manufacturers will undertake the production of assembled vehicles and the demands for American standard parts will be very large.

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Minneapolis Has Clearing House for Speed Complaints

MINNEAPOLIS, MINN., Aug. 7—Following a long series of accidents and deaths in July a clearing house for complaints against violation of traffic ordinances by automobile drivers was formed by the Minneapolis Civic and Commerce Asso. Some of the drivers who caused deaths were indicted by the grand jury. Three drivers were sentenced to the workhouse for reckless speed and nine jitney drivers were fined or imprisoned.

Five complaints were received by the bureau in the first hour. Twenty complaints were received the second day. Passing open street car gates within less than 10 ft., overtaking and passing street cars on the left side of the street, speeding, driving without lights, stopping on left side of street, were chief complaints.

At the end of the second week none had been killed and the average of four accidents a day in July had been cut to less than one a day. One reason is better observance of rules for pedestrians issued by the committee of safety.

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Louisville Bans Headlight Glare

LOUISVILLE, KY., Aug. 5—According to an announcement made yesterday by Mayor Buschmeyer to a committee from the Louisville Commercial Club, glaring headlights on motor vehicles must go. There is a city ordinance regulating headlights but, it is said, it has not been strictly enforced. It is expected owners will be given until Sept. 1 to eliminate the objectionable features by means of ground glass shades over the upper portion of the light, or full shade with small "bull's eye" in the center. After that date active steps will be taken to enforce the ordinance. Members of the Louisville Automobile Club, which has a membership of nearly 1000, have been asked to co-operate in the movement to eliminate the headlight glare danger.

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Dim Headlights in Indianapolis?

INDIANAPOLIS, IND., Aug. 7—Mayor Bell is credited with the statement that the city administration will take steps immediately to bring about the passage by the City Council of a new automobile headlight dimmer ordinance, the present ordinance having been declared invalid by Judge Deery in a recent Police Court decision. Harry E. Raitano, city prosecutor, announces that he will enter an appeal in the Marion Circuit Court from Deery's decision declaring the automobile light dimmer ordinance invalid. Judge Deery's decision freed more than fifty automobile drivers who had been arrested in the crusade conducted by the police.

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Traffic Committee Protests Sprinkling

NEW YORK CITY, Aug. 7—The Citizens' Street Traffic Committee at its meeting this week adopted a resolution pointing out the inefficiency and danger of street sprinkling and calling on street officials to stop it. The substitution of street flushing was recommended. Street Commissioner Fetherston stated that his department was opposed to street sprinkling and only practised it in conjunction with sweeping. The sprinkling complained of, he said, was done by private subscription.

Test Headlights in Bay State

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Highway Commission Engineers Measure Rays, Etc., for Report on Glare

BOSTON, MASS., Aug. 9—Under the direction of the Massachusetts Highway Commission there was a series of tests of motor headlights at the Country Club, Brookline, to-night. The last Legislature directed the commission to make a report of what should be done to regulate the lights so that there would not be a blinding glare in the eyes of people and operators of other cars.

Col. W. D. Sohier and James D. Synan were present for the commission, and they had members of the engineering staff on hand to measure the rays and otherwise compile data. All the motor organizations and a number of the accessory people were present with their devices.

Colonel Sohier, who is chairman of the commission, stated that he planned to have some regulation made and then ask Governor Walsh and members of the Council to approve of it. That would make it a law, and it could be changed from time to time by the same method when it needed improvements instead of having the Legislature do it.

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Fined $50 for Reckless Driving

HARTFORD, CONN., Aug. 9—Fifty dollars fine and thirty days in jail was the sentence imposed on two New Britain young men this week on a charge of reckless driving and attempt to evade responsibility.

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Boys Over 16 May Work in Michigan Plants

DETROIT, MICH., Aug. 5—J. V. Cunningham, Labor Commissioner of the State of Michigan, has taken some important decisions regarding the employment of young boys in factories. This was done in reply to inquiries from manufacturers who desire to know what kind of work the commissioner considers as too dangerous or hazardous for boys. The Michigan Legislature this year amended the labor laws and now boys under 18 but over 16 may be employed for certain work in factories.

The commissioner ruled that time checking, assembling, operating a machine lathe properly guarded, ordinary bench work, sheet metal work in automobile plants are not considered dangerous.

Power punch presses automatically operated and properly guarded, not requiring the operator to come in contact with the die, are considered safe, but power punch presses operated by foot or hand are considered dangerous. Boys may not adjust a die. Gang drill presses, wood working or wood turning lathes on account of speed and edged tools are considered dangerous and not to be handled by boys.

Automatic screw machines having belt shifter with belts, pulleys and gears properly guarded are considered safe.

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Cal. License Fees Reduced One-Half

LOS ANGELES, CAL., Aug. 6—Commencing Aug. 1 automobile license fees in the State of California were reduced 50 per cent, under the law which wisely holds that the remaining five months of 1915 should not be paid for at the full yearly rate.

The Southern California branch of the State motor department is now located in the new Union League Building at Second and Hill Streets, Los Angeles, in charge of Superintendent W. S. Goble.

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N. Y. Sightseeing Ordinance Vetoed

NEW YORK CITY, Aug. 9—Mayor Mitchel has vetoed the proposed ordinance that sightseeing cars might stand in front of a building where the owners have an office, if the consent of the police commissioner and the owner of the building has been secured. The Mayor stated that this would permit cars to sand at all times in front of the building. This is, in effect, the maintenance of a private stand where others may be excluded.

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To Fight Baltimore Ruling

BALTIMORE, MD., Aug. 7—Members of the Automobile Club of Maryland are preparing to fight the ruling which places automobiles under the same ordinance as wagons in that they cannot remain standing on the street more than 2 hr. at a time. This will mean that all the parking places about the city will have to be abolished. The police department has announced that it will begin to enforce the law on Sept. 15.

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Garage Men Planning State Organization

COLUMBUS, OHIO, Aug. 9—The Columbus Garage Owners, Asso. has arranged for a State convention of garage owners, to be held at Columbus, Ohio, Oct. 4, 5 and 6. The plan is to organize a strong State association for the benefit of garage men and tire repairers. A convention committee to arrange for the meeting consists of F. E. Avery, chairman, Robert T. McClure, secretary, and George McDonald, treasurer.

Notices have been sent out to 2000 garage men of the State inviting them to attend the meeting and to give their views of the question of forming a State organization.

Zenith Far Ahead of 1914

Last Year's Total Business Already Surpassed—10,000 Carbureters Monthly Output

DETROIT, MICH., Aug. 9—With two months still to go before the end of its fiscal year, the Zenith Carbureter Co. has already passed its total production of 1914. Business has been steadily increasing since January, and at the present time the monthly output averages 10,000 carbureters. Prospects are the best the company ever experienced and the outlook for 1916 is that it will be another record-breaking year.

The business increase has not been confined to any special type of carbureter, neither has it been exclusively in the passenger car field, but it has also increased considerably in the motor truck field. A reinforced concrete addition is being erected which will give the company much needed additional floor space.

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To Make Bullet-Proof Tires

SOUTH BEND, IND., Aug. 9—The Zeglen Tire & Fabric Co. has been organized in this city to manufacture automobile tires from the Zeglen bullet-proof fabric invented some years ago by Casmir Zeglen. Headquarters of the company will be established in this city. The elimination of all the tire troubles which the average motorist experiences is promised by the backers of the concern. The cost of tires manufactured from the Zeglen fabric will be only 10 per cent greater than that of the average tire, it is said. It is planned to manufacture tire casings here and dispose of them to tire manufacturers. Some of the advantages claimed for the new tires are: freedom from cuts, punctures and stone bruises, elimination of blow-outs and prevention of bulging and rim cutting. In addition to the tire fabric the concern plans the manufacture of protectors for ordinary pneumatic tires; these will serve as guards for inner tubes.

Mr. Zeglen won considerable prominence some time ago by the invention of a bullet-proof coat.

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Oakes Capital Now $75,000

INDIANAPOLIS, IND., Aug. 11—The Oakes Co., this city, has increased its capital $50,000 to $75,000. The officers of the company remain the same.

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To Push Ampco Bronze for Bearings—Capital Increased

MILWAUKEE, WIS., Aug. 7—The American Metal Products Co., Thirtieth Street and Lisbon Avenue, Milwaukee, Wis., which recently announced the perfection of a new metal alloy known as Ampco bronze, the invention of A. Littmann, is now making a campaign in the automobile and garage industry for the use of the alloy for high-speed bearings. Twenty Milwaukee garages, repair shops and machinery and supply companies have been appointed agents and in addition to marketing the bronze for initial use, emphasis is laid upon its use for replacement of bearings. The company has increased its capital stock from $25,000 to $100,000 to accommodate the increased production and trade.

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Few Market Changes

NEW YORK CITY, Aug. 10—The markets for the past week made very few changes, there were but a few gains and very heavy losses. The heaviest loss occurred on Wednesday when open-hearth steel dropped from $25 to $22.50, a total drop of $2.50. The rest of the steel markets made no changes.

The lead was also a bit unsteady when during the first part of the week it rose from $4.75 to $5.00 and then made a considerable drop on Monday of 37½ cents. Copper declined when leading interests quoted 18 cents but round lots were at 17¾ cents, the cause being another severe break in London. While this reduction was noted in some quarters on Saturday, the cut to 18 cents became general yesterday. In the open market the metal was offered at 17⅞ cents with no buyers. The cotton oil market was dormant yesterday with trading being so light that there was scarcely any market at all. There were no changes in the oil and lubricant markets.

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Elmira Truck Projected

ELMIRA, N. Y., Aug. 7—Organization of the Elmira Commercial Motor Car Co. has been completed. The concern has been incorporated in New York with a $500,000 capital. The plan is to produce a vehicle of 500-lb. capacity to sell at $300, after the designs of W. H. Ives of the defunct Ives Motorcycle Corp., Owego, N. Y.

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Detroit Forging Business a Third Larger

DETROIT, MICH., Aug. 9—During the fiscal year of the Detroit Forging Co. which ended Aug. 1, this company did one-third more business than during its previous business year. Manufacturers have been ordering much earlier than last year and all have greatly increased their orders. One of the largest orders ever received by the company was taken a few days ago being for 2,000,000 forgings, valued at over $75,000.

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Guelph Tire & Rubber Elects

GUELPH, ONT., Aug. 7—Several citizens of Berlin were present at a large and enthusiastic meeting of the shareholders of the Independent Tire Co., now known as the Guelph Tire & Rubber Co. This was the first meeting since the liquidation and the reorganization of the company. The provisional directors retired and the first board of directors was elected, which consisted of Messrs. J. E. Carter, Guelph; D. McIntosh, Guelph; L. Kaufman, Ohio; H. L. Davidson, Southampton; R. Dunn Wellesley and Dr. Winning, London, Ont.

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Safety-First Convention Oct. 19-20

NEW YORK CITY, Aug. 7—The date for the first annual convention of the Safety-First Federation of America to be held in Detroit, has been set for Tuesday and Wednesday, Oct. 19 and 20. The program has not as yet been prepared.

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Lindoerfer Leaves Atterbury Co.

BUFFALO, N. Y., Aug. 7—Frank C. Lindoerfer has resigned as general sales manager for the Atterbury Motor Car Co. to take charge of the distributing branch of the Bessemer Truck Co. in this city. With Mr. Lindoerfer is associated Norman B. Harrington, who has been connected with the Atterbury company for the past four years. All of the Eastern territory will be handled through the Buffalo office. Mr. Lindoerfer started

Daily Market Reports for the Past Week

Material.	Tues.	Wed.	Thurs.	Fri.	Sat.	Mon.	Week's Changes
Aluminum	.33	.33	.33	.33	.33	.33	.....
Antimony	.35	.35	.35	.35	.35	.35	.....
Beams & Channels, 100 lbs.	1.25	1.30	1.47	1.47	1.47	1.47	+.22
Bessemer Steel, ton	22.00	22.00	22.00	22.00	22.00	22.00	.....
Copper, Elec., lb.	.18¼	.18¼	.18¼	.18¼	.18	.17⅝	—.00⅜
Copper, Lake, lb.	.19	.19	.19	.19	.18½	.18¼	—.00¾
Cottonseed Oil, bbl.	5.88	5.83	5.84	5.90	5.95	5.86	—.02
Cyanide Potash, lb.	.23	.23	.23	.23	.23	.23	.....
Fish Oil, Menhaden, Brown	.40	.40	.40	.40	.40	.40	.....
Gasoline, Auto, bbl.	.13	.13	.13	.13	.13	.13	.....
Lard Oil, prime	.87	.87	.87	.87	.87	.87	.....
Lead, 100 lb.	5.00	4.75	4.50	5.00	5.00	4.62½	—.37½
Linseed Oil	.54	.54	.54	.54	.54	.54	.....
Open-Hearth Steel, ton	25.00	25.00	22.50	22.50	22.50	22.50	—2.50
Petroleum, bbl., Kan., crude	.50	.55	.55	.55	.55	.55	+.05
Petroleum, bbl., Pa., crude	1.35	1.35	1.35	1.35	1.35	1.35	.....
Rapeseed Oil, refined	.77	.77	.77	.77	.77	.77	.....
Rubber, Fine Up-River, Para	.59	.59	.58	.58	.58	.57	—.02
Silk, raw, Ital.	..	..	3.80	..	..	3.80	.....
Silk, raw, Japan	..	..	3.42½	..	..	3.45	+.02½
Sulphuric Acid, 60 Baume	.90	.90	.90	.90	.90	.90	.....
Tin, 100 lb.	35.50	35.37½	34.75	34.50	34.50	34.25	—1.25
Tire Scrap	.04¾	.04¾	.04¾	.04¾	.04¾	.04¾	.....

with the Haynes-Apperson Automobile Co. sixteen years ago and has been connected with the automobile industry ever since.

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Takes Over Mason Stock

FLINT, MICH., Aug. 6—Complete linking of the Mason Motor Co. with the Chevrolet Motor Co., Flint, Mich., has been accomplished by the taking over of the remainder of the Mason stock by the Chevrolet company.

At the same time that the stock transfer was completed ground was broken for an addition to the Mason factories and twenty more acres of ground were secured on three sides of the Chevrolet plant.

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Daly Resigns from King Co.

DETROIT, MICH., Aug. 6—W. L. Daly, sales manager of the King Motor Car Co., has resigned and after a short rest will enter into an individual venture of his own. R. P. Bishop, assistant to Mr. Daly, succeeds him. I. B. Meers enters into the position formerly held by Bishop.

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Dividends Declared

Maxwell Motor Co., quarterly of 1¾ per cent first preferred together with an additional dividend of ¾ of 1 per cent on said stock, payable Oct. 1.

Studebaker Corp., quarterly of 1¾ per cent on preferred and 1¼ per cent on outstanding common, payable Sept. 1.

B. F. Goodrich Co., 1¾ per cent on preferred, payable Oct. 1.

Standard Oil Co. of California dividend payable Sept. 15 to stockholders of record Aug. 20.

Security Prices Higher

Sturdy Demand in All Stocks —General Motors Makes High Record

NEW YORK CITY, Aug. 9—Except for a few fractional declines, most of the stocks that changed made substantial gains in this week's security quotations. Resistance to all disquieting influences with a consequent active market, strong tone and higher prices, were the dominant feature. At the beginning of the week there was an upward rush. After this a selling movement of considerable moment set in. Some of the issues again displayed advances similar to those which were so frequent in April and May.

Changes this week ranged from gains of one-quarter to twenty-four points and loses from one-quarter to three points. General Motors common featured the market with a twenty-four-point rise, closing at 203, at an absolute high record. The strength of this issue was attributed to expectation of early dividend action. It is stated that the company will have a net profit for the fiscal period of $20,000,000 meaning a balance for the common of nearly 60 per cent. Willys-Overland common also reached a high price level with a gain of ten and one-half points.

Tire issues showed gains, though not as high as usual. B. F. Goodrich common went up one-quarter point, while that of the preferred rose a half-point. Kelly-Springfield first preferred rose three-fourths of a point, while that of Swinehart and U. S. Rubber rose two points. The rest of the tire issues remained unchanged. The Detroit issues showed very large substantial gains, ranging from one to seventy-five points, with losses slight from one-fourth to ten points.

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Paine President Detroit Commercial Co.

DETROIT, MICH., Aug. 7—W. D. Paine, who was supervisor of sales of zone 4 of the Maxwell Motor Co., has resigned to become president and sales manager of the Detroit Commercial Co. Mr. Paine was with the Maxwell company since its organization. He also was formerly with the Studebaker Corp. and the E-M-F company.

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Cooper Maxwell Supervisor

DETROIT, MICH., Aug. 7—L. K. Cooper has been appointed supervisor of sales in zone 4, by the Maxwell Motor Co., taking the place of W. D. Paine, who resigned. Mr. Cooper has been with the Maxwell organization since its inception and was on special duty in Chicago during the past season. Now his headquarters will be Detroit and his territory stretches from the Great Lakes to the Gulf of Mexico and includes auxiliary offices in Indianapolis, Ind., and Memphis, Tenn. It was Mr. Cooper who won the first prize, $500, in the Maxwell sales competition of the past season.

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Ollier Studebaker Director

DETROIT, MICH., Aug 7—L. J. Ollier, sales manager of the Studebaker Corp., has been named a director of that organization.

Automobile Securities Quotations on the New York and Detroit Exchanges

	1914 Bid	1914 Asked	1915 Bid	1915 Asked	Wk's Ch'ge
Ajax-Grieb Rubber Co. com			300	..	..
Ajax-Grieb Rubber Co. pfd			101	..	..
Aluminum Castings pfd			98	100	..
J. I. Case pfd			70	78	..
Chalmers Motor Co. com			90	93	..
Chalmers Motor Co. pfd			96	97	..
Electric Storage Battery Co			52	53	..
Firestone Tire & Rubber Co. com			506	510	..
Firestone Tire & Rubber Co. pfd			109	111	..
General Motors Co. com			203	205	+24
General Motors Co. pfd			105	107	+2
B. F. Goodrich Co. com			50¾	51¾	— ¼
B. F. Goodrich Co. pfd			104	105	+ ½
Goodyear Tire & Rubber Co. com			268	270	..
Goodyear Tire & Rubber Co. pfd			105	106½	..
Gray & Davis, Inc., pfd			..	..	..
International Motor Co. com			19	20	+4
International Motor Co. pfd			43	45	+5
Kelly-Springfield Tire Co. com			170	175	..
Kelly-Springfield Tire Co. 1st pfd			85¼	86½	+ ¾
Kelly-Springfield Tire Co. 2d pfd			160	170	..
Maxwell Motor Co. com			35	36	+2
Maxwell Motor Co. 1st pfd			84	85	+2
Maxwell Motor Co. 2d pfd			32¾	33¾	+3¼
Miller Rubber Co. com			196	199	..
Miller Rubber Co. pfd			104	106	..
New Departure Mfg. Co. com			..	..	..
New Departure Mfg. Co. pfd			..	..	..
Packard Motor Car Co. com			..	120	..
Packard Motor Car Co. pfd			..	101	..
Peerless Motor Car Co. com			67	70	—3
Peerless Motor Car Co. pfd			94	96	+8½
Portage Rubber Co. com			36	38½	+2½
Portage Rubber Co. pfd			92	95	..
*Reo Motor Truck Co			17¼	19	+ ¼
*Reo Motor Car Co			33¼	34½	+2½
Splitdorf Electric Co. pfd			..	..	..
Stewart-Warner Speed. Corp. com			61½	63	+1½
Stewart-Warner Speed. Corp. pfd			105	107	..

No quotations available.

	1914 Bid	1914 Asked	1915 Bid	1915 Asked	Wk's Ch'ge
Studebaker Corporation com			83¾	84¼	+1¾
Studebaker Corporation pfd			103	104½	+2
Swinehart Tire & Rubber Co			85	90	—3
Texas Co			139	141	+7½
U. S. Rubber Co. com			47	48	+2
U. S. Rubber Co. 1st pfd			104	105	+1¼
Vacuum Oil Co			220	225	+16
White Co. pfd			103	108	..
Willys-Overland Co. com			146	147	+10½
Willys-Overland Co. pfd			103	105	..
ACTIVE STOCKS					
Chalmers Motor Co. com	..	99½	..	..	..
Chalmers Motor Co. pfd	..	..	85	88	—10
Continental Motor Co. com	155	180	..	300	+75
Continental Motor Co. pfd	..	75	83	86	—1
General Motors Co. com	63	75	195	200	+19
General Motors Co. pfd	..	85	105	107	+1
Maxwell Motor Co. com	..	..	35	37	+2½
Maxwell Motor Co. 1st pfd	..	..	83½	85½	+2
Maxwell Motor Co. 2d pfd	..	..	32	34	+3
Packard Motor Car Co. com	..	..	..	120	+4½
Packard Motor Car Co. pfd	..	98	..	101	+ ¾
*Reo Motor Car Co	19¾	20¾	33¼	34½	+1
*Reo Motor Truck Co	11	12	17¼	17¾	— ¼
Studebaker Corporation com	..	..	82½	84	—1¾
Studebaker Corporation pfd	..	..	101	103	+1
INACTIVE STOCKS					
*Atlas Drop Forge Co	19	..	25½	..	..
Ford Motor Co. of Canada	..	560	1475	1525	..
Kelsey Wheel Co	185	..	205	..	..
*W. K. Pruden Co	..	20½	20¼	..	..
Regal Motor Car Co. pfd	23	..	..	21	..
BONDS					
General Motors, notes, 6s, 1915	100	..	..	..	..
Packard Motor Co., 5s, 1916	..	..	98¼	..	..

*Par value $10; all others $100 par value.

10,000 Farmers at Tractor Test

May Make Illinois Demonstration a Yearly Affair—Many Sales—Lectures Given

CHAMPAIGN, ILL., Aug. 7—Ten thousand farmers and others interested attended the first Illinois tractor demonstration upon a spacious tract 5 miles south of this city last week. Four days were selected for the exhibition, but the opening days were marked by rain which limited the show to the two closing days, Thursday and Friday. Despite the weather handicap, the demonstration was voted a great success. Due to the proximity of the University of Illinois here, and its well-known attraction for all followers of agriculture, Champaign was the choice of the visitors as the permanent location of the annual exhibit, and it is believed that definite arrangements will be made later for the second demonstration some time in August of 1916. It was suggested that all farm implements be exhibited in conjunction in order to increase the interest and attract the farmers, but the tractor representatives and editors of the farm journals in attendance were opposed to this, and it is likely that in all future events the attractions will be limited to tractors. The demonstration given last week was not a contest and no prizes were awarded.

Conditions of Tests Uniform

To this end all fuel used was of the same grade, the depth of plowing and engine speed regulated, and every effort made to make the demonstration a real showing of what the machines can do in farm work. The mornings were devoted to private demonstrations at which the manufacturers were given considerable latitude in the kinds of work performed. The formal demonstration took place in the afternoon. Each machine was allotted a strip of ground for plowing in accordance with the rules of the field manager. The following is the list of exhibitors: Avery Co., Peoria, Ill.; Bates Tractor Co., Lansing, Mich.; Bull Tractor Co., Minneapolis, Minn.; Bullock Tractor Co., Chicago, Ill.; J. I. Case Co. (Wallis tractor), Racine, Wis.; Corn Belt Tractor Co., Minneapolis, Minn.; Dayton Dick Co. (Leader tractor), Quincy, Ill.; Dauch Mfg. Co., Sandusky, Ohio; Denning Motor Implement Co., Cedar Rapids, Iowa; Electric Wheel Co., Quincy, Ill.; Emerson, Brantingham Co., Rockford, Ill.; Ford Tractor Co., Minneapolis, Minn.; Harrt-Parr Co., Charles City, Iowa; Heider Mfg. Co., Carroll, Iowa; Hoke Mfg. Co., South Bend, Ind.; Holt Mfg. Co., Peoria, Ill.; Huber Mfg. Co., Marion, Ohio; Hume Tractor Co., Hume, Ill.; International Harvester Co., Chicago, Ill.; Joliet Oil Tractor Co., Joliet, Ill.; Kinnard-Haines Co., Minneapolis, Minn.; Lawter Tractor Co., St. Marys, Ohio; Lion Tractor Co., Minneapolis, Minn.; Parrett Mfg. Co., Chicago, Ill.; Peoria Tractor Co., Peoria, Ill.; Sweeney Tractor Co., Kansas City, Mo.; Steel King Tractor Co., Detroit, Mich.; Universal Tractor Co., Columbus, Ohio; Waite Tractor Co., Chicago, Ill., and Waterloo Gasoline Engine Co., Waterloo, Iowa.

The climax to the demonstration came on Friday when thirty-two engines, pulling from two to six plows, went along side by side in a stubble field 110 acres in extent. The larger type of machine, built to pull eight plows of 14-in. bottoms, and the smaller type, with but two plows connected, worked side by side and the farmers were able to note the advantages of each. Turning under 3-ft. rag weeds in ground that had not been touched by a plow for many years was a severe test for the tractors, and some had all that they could do. A 40-acre field of sod was plowed up in quick time. It was observed by many of the farmers that tractors which had been prime favorites on the exhibition lot were not so popular after the plowing tests started, while others that had been regarded as freaks were able to give a better account of themselves than their more pretentious neighbors. Some small outfits that had been regarded as toys were able to demonstrate that they were real tractors in plowing, while some of the huge machines found considerable trouble in handling the weed problem. Many farmers who came doubters returned home purchasers. "I like your tractor but I cannot afford it," remarked one farmer to a tractor salesman. "How many horses will it take to do the work of this machine upon your farm," asked the salesman. "Seven," was the reply. "At $150 each, they are worth $1,050, while my machine sells for less than $1,000," was the agent's observation. The farmer saw the point and placed his order. Several hundred sales were reported as a result of the exhibition, and all companies represented were well pleased over the results. Incidental to the demonstration there were evening programs of lectures. C. O. Reed of the University of Illinois spoke upon the subject of adjusting and operating plows. F. I. Mann of Gilman told of plowing and tillage from the farmers' standpoint. Prof. I. W. Dickerson of the University of Illinois answered in the affirmative the question, Shall I buy a Tractor? Raymond Olney gave a lecture on tractor operation with moving pictures in conjunction. Prof. F. M. White of the University of Wisconsin gave a talk upon traction economies.

P. O. Truck Bids Open Sept. 8

Five or More Each of ½-Ton to 3-Ton Vehicles to Be Purchased

WASHINGTON, D. C., Aug. 10—*Special Telegram*—On Sept. 8 the post office department will open bids for furnishing and delivering from time to time as they may be required during the next fiscal year for use in the postal service, the following gasoline motor trucks: Five or more of ½-ton capacity; five or more of ¾-ton capacity; five or more of 1½-ton capacity; five or more of 3-ton capacity. Proposal blanks, specifications and blueprints will be furnished upon application to the purchasing agent of the post office department.

Chemicals High-Batteries High

NEW YORK CITY, Aug. 11—Batteries are selling at 35 cents, compared with 25 cents a short time ago. The materials used in the construction of the coil have advanced enormously, due to the war.

Manganese, the shortage of which has affected the steel trade, is one of the four ingredients of the dry cell, the others being ammonium chloride, the carbon rod and the zinc case. The manganese dioxide used in the cells is now selling for $120 a ton, compared with $25 to $30 a ton before the war closed the Dardanelles and cut off supplies from the Black Sea, which formerly furnished the bulk of the ore used here.

The advance in zinc, or spelter, has also boosted the price of dry cells. As high as 32 cents has been paid for the grades of spelter used in making dry batteries.

Ammonium chloride was formerly imported, largely from England and Germany, in considerable quanties at 5½ and 6 cents a pound. Domestic manufacturers are now turning out this chemical at about 7½ cents a pound, and there is apparently no danger of a shortage.

Velie Sells 600 War Trucks

MOLINE, ILL., Aug. 7—The Velie Engineering Co. of this city has received a contract from the French Government for 600 light trucks. The stipulation is that 275 vehicles on the order must be deivered at New York by Jan. 1.

Truck Ousts Mail Cars

BOSTON, MASS., Aug. 7—Motor trucks have been substituted for trolley cars in the handling of mail between the general post office and sub-stations in the Boston postal district. A corporation known as the Boston Mail Delivery Co.,

has been organized with a capital of $50,000 to carry out a two-year contract with the government, beginning Aug. 15.

There are fifteen 3000-lb. trucks, all of General Vehicle Co., manufacture, being of a pattern similar to the sixty-eight electric trucks which handle the mails in New York City.

The runs into the Boston suburbs vary from 15 to 24 miles in length, with numerous stops at the various sub-stations. Cars will be garaged and cared for at the Boston Edison Co.'s electric garage on Atlantic Avenue.

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Allis-Chalmers Tractors for Russia

MILWAUKEE, WIS., Aug. 7—An order for a number of new tractor trucks produced by the Allis-Chalmers Mfg. Co. has been received from Russia. These trucks are different from the ordinary commercial vehicle in that they are fitted with creeping or track laying traction devices in place of the rear wheels and their front axles are pivoted at the center to allow them to negotiate rough roads. They have steel tires in front and have steel track in the rear.

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French Contract Rumor Denied

NEW YORK CITY, Aug. 9—A report published in a New York daily purporting to be a cable dispatch from Paris stated that J. P. Morgan & Co. had negotiated a contract with the French Government for the entire motor truck output of the Packard, White and Pierce-Arrow companies for an indefinite period. Charles Clifton, treasurer of the Pierce-Arrow Motor Car Co., Buffalo, N. Y., C. R. Norton, truck sales manager of the Packard Motor Car Co., Detroit, and J. A. Harris, Jr., advertising manager of the White Co., Cleveland, have each denied that any such contract has been made or that they have any knowledge of negotiations for same. Each strongly brings out the fact that his company is not contemplating any exclusion of the very desirable and permanent domestic trade.

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May Register Tractors in Kansas

TOPEKA, KAN., Aug. 5—The tremendous impetus given the tractors in Kansas during the past few weeks has accounted for the interest of Mr. Curt Myers in having an automobile registration department in the office of J. T. Botkins, Secretary of State. Mr. Myers has expressed himself as of the opinion that the tractors should pay a license registration fee the same as automobiles, because they are harder on the paving of the roads than the rubber-tired cars. It is possible that legislation providing for the registration of tractors may be introduced at the next session.

75,000 Cars for Wisconsin

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20,000 More Cars Registered on August 1 Than in Whole Year 1914

MILWAUKEE, WIS., Aug. 9—Wisconsin's motor car registration on Aug. 1 reached approximately 20,000 more than the entire registry for the year 1914. There is no question now that the total registration for 1915 will exceed 75,000, the estimate made in these columns at the beginning of the year. The comparative figures on Aug. 1 were:

	Aug. 1, 1914	Aug. 1, 1915
Motor cars	48,000	73,100
Motorcycles	7,100	8,045
Dealers	1,150	1,520

It will be seen that not only have private registrations increased enormously, but the number of dealers is much larger. The registration of dealers for 1914 showed a loss of about 350 compared with the 1913 total.

A. J. Cobban, motor registry clerk in the Secretary of State's office at Madison, says that applications continue at the rate of about 200 a day and figures that the 75,000 mark will be reached before Aug. 31. Instead of being spotty as in former years, this year's registrations are uniformly maintained from month to month, indicating a greater stability and soundness in motor car buying by the people of Wisconsin.

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Kansas Registrations Amount to $48,959

TOPEKA, KAN., Aug. 6—The reports of W. E. Davis, State Auditor, show that for the year ending June 30 the State received as its share of the motor car and motor cycle license fees $48,959.25; last year the sum was $30,702; the State receives 75 cents of each $5 paid for a motor car license and 50 cents of each $2 paid for a motor cycle license. The bulk of the money goes into the road fund of the county issuing the license. During July of 1915 the State received $23,733.25; July receipts, 1914, were $8,267. Sedgwick county paid the largest sum during the year, $2,736.50; Reno county, $1,760.50; Shawnee county (in which is Topeka), $1,566.25.

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One Car to Every 15 Persons in Pomona

POMONA, CAL., Aug. 3—Deputy Assessor C. W. Talbott of this city allows one motor car to every fifteen citizens and estimates that one-fourth of the families living in Pomona own automobiles. His report shows that there are 825 machines here and that they represent an original expenditure of more than $500,000, although the 1915 assessed valuation is $165,000. The total amount of tax collected on automobiles in Pomona this year will be $2,700 or about 2 per cent of the entire tax collections of the city. The deputy assessor estimates that $10,000 is the sum that was paid this year for State licenses. The State and county taxes amount to $3,300 and the city taxes $2,700 bringing the total expense of owning cars up to $16,000 for the year. Fifty cars have been purchased since the assessor closed his books.

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Maryland Business Lines Must Maintain Reserve Equipment

WASHINGTON, D. C., Aug. 7—The Maryland Public Service Commission has issued a set of rules governing the operation of various motorbus lines in the State. An important regulation is that requiring all owners of such services to maintain sufficient reserve equipment in good operating condition. In the opinion of some this rule is construed as an intention on the part of the commission to require the acquirement of additional cars which at all times must be held in reserve in case of a breakdown of the regular cars.

The new rules require that all motor vehicles used in the transportation of passengers or freight within the State for service charge shall be under the jurisdiction of the commission, the same as other common carriers. All such vehicles must be registered with the commission and upon registration the owners will be furnished with identification cards for each vehicle, whether held in reserve or otherwise. The commission reserves the right to arrange or rearrange the routes and schedules so as to prevent congestion on the highways.

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Oklahoma Registration, $50,000

OKLAHOMA CITY, OKLA., Aug. 7—Approximately $50,000 was received by the State highway fund up to Aug. 1 from licenses issued to automobiles by the State Highway Commissioner, from the time the new law went into effect. This sum was derived from approximately 7500 automobiles. The money derived from the taxation of automobiles by the State is to be returned to the counties.

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Van Speedometer Contracts

ELGIN, ILL., Aug. 7—The Van Sicklen Co., which has new general offices in this city, has closed contracts with the manufacturers of the Marmon, Monarch and the new Detroiter for the Van speedometer as standard equipment for the coming year.

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$1,000,000 Tire Co. Formed

DOVER, DEL., Aug. 10—The Perfection Tire Sales Co., to deal in all kinds of tires, has been incorporated, its capital being $1,000,000. F. J. Handel, L. B. Bautz, and M. M. Bennett of Buffalo, are the incorporators.

Astor Cup to Open Sheepshead

Vincent Astor Offers Perpetual Trophy—American Cup Later—Rush Work

NEW YORK CITY, Aug. 9—When the Sheepshead Bay Speedway opens on Oct. 2 the 350-mile inaugural race will be for a perpetual automobile trophy which was offered yesterday by Vincent Astor, the event to be known as the Vincent Astor Cup race. Originally it was intended to have the first race known as the American Cup Race, but with the offering of the Astor Cup it was decided to make this the first race over the Speedway, and the American Cup race will be contested at a later date.

Good progress is being made on the Sheepshead 2-mile board speedway and it is expected that the board surface on which the cars will run will be finished Aug. 20, and the grandstand Sept. 10. The protective walls on the outside of the track and on the inside of the safety apron are more than half completed. Tunnels for six lines of automobiles are being excavated and the concreting of these has begun. One of the small passenger tunnels has been completed. The main grandstand, which is a two-story steel affair, will be 1300 ft. long, and 600 ft. of the double deck structure has already been completed. About 1000 ft. of the open wood bleachers on the back stretch are completed.

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850-Mile Reliability Run through Rockies Sept. 6

DENVER, COL., Aug. 7—An 850-mile sanctioned reliability and economy run of six days through the Rockies in Colorado is scheduled to start from Denver on Sept. 6.

The run will follow the Midland trail directly west from Denver by way of Golden, Lookout mountain, Idaho Springs, Barthoud pass, Hot Sulphur Springs and Kremmling, where the route will swing over the new Rabbit Ear pass road now being completed by the United States Forest Service into Steamboat Springs. The second day will be from Steamboat Springs to Craig over the northern branch of the Midland trail, and thence south through the wild fishing and big game country to Meeker, from where it will follow a link of the Pike's Peak Ocean to Ocean highway to Rifle and Glenwood Springs. The third day's run will be over the main line of the Midland trail to Grand Junction, near the Utah line. The fourth will start the return eastward over the Rainbow route through Delta, Montrose, Gunnison and over Monarch pass to Salida. The fifth will continue on the same road through the Royal Gorge to Canon City and Florence, and the sixth return to Denver by way of Pueblo and Colorado Springs over the Gulf-National Parks highway.

The trip will take in some of the grandest scenery to be found anywhere, and is counted upon to make a widely-felt demonstration of the feasibility of motoring over Colorado's picturesque roads through the mountains.

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$500,000 Speedway for St. Louis

ST. LOUIS, MO., Aug. 7—Initial steps toward raising a $500,000 fund for the building of an automobile speedway and grandstand at Maxwellton, St. Louis County, were taken here this week. Part of the half million dollar fund has been raised and it is not improbable that construction will be begun soon. The details of the project will be made public following another meeting next week.

Maxwellton at present has an excellent mile dirt track and a large wooden grandstand.

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Show Announcements

MILWAUKEE, WIS., Aug. 9—An automobile show will be held in this city, Sept. 13 to 17, when the Milwaukee Automobile Dealers, Inc., will conduct the exposition at the State fair grounds during the State fair week. Machinery Hall will be used exclusively for the show.

VENTURA, CAL., Aug. 9—An automobile show is to be a feature of the annual county fair which is scheduled to open here Aug. 26. There are to be more than seventy-five automobiles on exhibition. The automobile exhibits are to be located in a large tent, 100 by 210, placed on the half-mile race track.

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Denver's Show Plans Progressing

DENVEP, COL., Aug. 9—Entries for the automobile and accessory display planned by the Automobile Trades Asso. of Colorado for the two weeks of the International Soil Products Congress in Denver, Sept. 27 to Oct. 9, are now being solicited by a special committee from the association, and the outlook is favorable for a large representation. Five dealers have already contracted for space, and twice that many more have practically pledged themselves to sign up at an early date. Trade conditions in Colorado and neighboring States in the Rocky Mountain territory are exceptionally good this year, and the show is counted upon to draw attendance from a wide district, especially on account of being held in conjunction with the farming congress, an annual feature.

Rush Twin City Speedway

Working Force Tripled—To Finish by Aug. 15—10,000 Seats Sold in Block

MINNEAPOLIS, MINN., Aug. 9—With the cessation of rain the working force at the Twin City Speedway has been tripled and work is to be finished by Aug. 15. One entire grandstand, nearly 10,000 seats, was sold entire to St. Paul, Aug. 7. Every drug store keeper in Minnesota, the Dakotas, Montana and parts of Iowa have been enlisted in selling seats. Placards and newspaper advertising in every county in Minnesota refer ticket buyers to the druggists. Five hundred militia men have been reserved to police the speedway on Sept. 4.

W. W. Brown, dirt track driver in a Du Chesneau, filed entry Aug. 6.

A cup has been offered by the Speedway for touring clubs. Number of miles traveled, multiplied by cars taking part, gives the score.

The War Department has approved the plan to extend the street railway through the reservation at Fort Snelling to the Speedway. This will give transportation for thousands of persons.

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100-Mile Invitation Race for Indianapolis Oct. 9

INDIANAPOLIS, IND., Aug. 10—The Indianapolis Motor Speedway has to-day been granted a sanction for a 100-mile invitation race to be held on the speedway here Oct. 9. Six cars will start, the piston displacement maximum being 300 cu. in. It is understood that $10,000 in cash prizes will be awarded.

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Ricker Indiana A. A. A. Representative

INDIANAPOLIS, IND., Aug. 7—Charles W. Sedwick, who has been the Indiana representative of the American Automobile Association since 1908, has resigned and Chester Ricker has been appointed to fill the vacancy.

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May Stage Corona Road Race Oct. 1

CORONA, CAL., Aug. 5—There is to be a Corona road race this coming fall, according to prominent business men of the city. A committee has already been appointed to place the stock to guarantee the $15,000 purse and in lots of from one to five shares, more than half of the race stock has been sold within four days. The stock is selling at $50 per share, with one-half down and personal notes for the balance. No stock is being sold outside of Corona and no one person is allowed to purchase more

than five shares. It is certain that the race will not be held on Thanksgiving Day. It is proposed to hold the race about Oct. 1 and the Corona classic will be the only road race held in Southern California this season, if the "Desert Classic" is not revived, which is hardly probable.

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150-Mile Race for Fresno

FRESNO, CAL., Aug. 5—Plans are rapidly being completed for the staging of a 150-mile race for a $5,000 purse on the 1-mile dirt track of the Fresno County Agricultural Assn., Oct. 2. This will close the district fair here which is an annual five-day event. The grandstand has a seating capacity of 30,000 and the drivers will be in full view of the spectators at all times.

L. A. Nares will referee and the judging will be done by W. E. Drury, Bakersfield; W. L. Hughson, San Francisco; L. S. Upson, Sacramento; John R. Graham, Merced; H. C. Carr, Porterville; S. C. Walker, Visalia. Mr. Cousins, from Hanford, will act as timer. The event is sanctioned by the contest board of the A. A. A.

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53 Maxwell Dealers Attend Announcement Banquet

LOS ANGELES, CAL., Aug. 4—The annual announcement banquet, given by the Lord Motor Car Co., southern California and Arizona distributors for the Maxwell line to their dealers from all over the territory, was held in the big banquet room of the Los Angeles Athletic Club, last Thursday night. The new 1916 Maxwell was displayed in Los Angeles for the first time on that day.

T. J. Toner of the Maxwell Motor Co. outlined the policy and plans for the 1916 season after the dinner. There were fifty-three Maxwell dealers and officials present, representing practically every city in Arizona and southern California.

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E. V. A. Convention Oct. 18-19

NEW YORK CITY, Aug. 7—The sixth annual convention of the Electric Vehicle Assn. of America has been scheduled for Monday and Tuesday, Oct. 18 and 19 at the Hotel Statler, Cleveland, Ohio. The decision to limit the convention to two days was arrived at on the occasion of the organization meeting of the convention held in Cleveland, July 19. The short period of the convention was determined upon owing to the other conventions which will occur in the fall and to the fact that it was deemed advisable to have a concentrated program consisting of real business rather than a longer and more social one, as busy men will be more likely to attend such a convention. Papers have not as yet been announced.

Thomas and Bablot Are Free

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Two Famous Drivers Not in Army Service—Six French Cars Are Available

PARIS, FRANCE, July 28—France is still able to lend some assistance to America in the way of furnishing racing drivers and racing cars. At present two drivers of international reputation are free from army service, these being Thomas, winner of the 1914 Indianapolis race, and Bablot, who has had international reputation. Cars available are three Delages, and one each of Schneider, Alda and Nagant. The following drivers are not available as they are doing army duty: Goux, Boillot, Guyot, Chassagne, Duray, Hemery, Rigal and Wagner.

If America expects to secure any of these cars for its speedway meets it will be necessary to buy them outright.

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New Co. in Cleveland

CLEVELAND, OHIO, July 31—Negotiations are about to be completed here for purchase of a site on the East Side for the erection of a plant for the manufacture of a new car to be built on the lines of a motor boat. The names of the new

An acre and a half with long-time options on additional ground for plant enlargement comprise the site where building is to begin as soon as the details have been worked out. Plans for the factory have been prepared, it is reported, by the National Engineering Co., this city, and the structure will contain about 25,000 sq. ft. of floor space. Equipment will cost $25,000 and the factory site $10,000.

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Baltimore's Jitney Fight in Court Starts

BALTIMORE, MD., Aug. 7.—The legal test of the new ordinance governing the jitney bus in Baltimore has started. Those fighting to have the new law declared unconstitutional claim that the tax of $25 a seat per year is burdensome. The case is being heard by Judge Elliott. As it stands at present, the city has been restrained from putting the new law into operation.

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Philadelphia Jitneys Receive Death Blow

PHILADELPHIA, PA., Aug. 7—The deathknell of the jitneys in this city was sounded to-day when, on the application of City Solicitor Ryan, Judge Sulzberger, of Common Pleas Court No. 2, vacated the temporary injunction which he had granted the Jitney Auto Service Co. on July 15 restraining the municipal authorities from enforcing the City Councils' drastic regulation of operation of jitneys over the city streets.

The failure of several jitney associations to sink personal animosities and petty jealousies was the cause of their undoing. The men failed to file the $2,500 bond designated in the Court's restraining order.

As the ordinance which will now go into effect requires the filing of individual bonds of $2,500 by each driver, officers of the associations admitted tonight that as the car owners in their aggregate capacity were unable to do so it was highly improbable that as individuals they would be able to do it.

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Baltimore Trolley Co. Enters Jitney-Bus Field

BALTIMORE, MD., July 24—The United Railways & Electric Co., of Baltimore, which has been hard hit by the jitney business in this city, has entered the field and is running a number of buses. The new company is the Baltimore Transit Co., and has been incorporated with a capital stock of $100,000. President William A. House, of the United, admits that the company is backed by the railway. William H. McKee of Philadelphia, is manager of the transit company.

President House says the railway's interest in this service is due to its desire to see a bona fide effort made to ascertain whether or not the jitney means of transportation is a desirable supplement to the present methods and the United's future action will depend upon this demonstration.

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Indiana Service Managers Organize

RICHMOND, IND., Aug. 7—A movement has been started to organize the service managers of the automobile manufacturing concerns in Indiana into an association to be known as the Organization of Service Managers in the State of Indiana. Twenty companies will be represented at the monthly meetings according to C. J. Elston, service manager of the Westcott Motor Car Co. of this city. The first meeting will be held to-day.

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Mercer Uses Houdaille Absorber

NEW YORK CITY, Aug. 9—Clodio & Engs, Inc., United States representatives of the Houdaille shock absorber, have received an order from the Mercer Automobile Co., Trenton, N. J., for Houdaille equipment on its 1916 production. The firm has started the manufacture of this article here, and it will now be standard in the American market.

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Safety Isles in Duluth Successful

DULUTH, MINN., Aug. 9—Aisles of safety for pedestrians, "no parking" zones, whistle signals for traffic policemen, and near stops for street cars have been inaugurated this week with success.

Packard Has New Machinery

Entire Factory Equipment Revised for Making Twin Six —Express Shipments

DETROIT, MICH., Aug. 5—Although new machinery and special tools are coming almost daily to the plant of the Packard Motor Car Co. to provide for the practically entire new equipment necessary in making the Twin-Six, the officials of the company have on several occasions lately gone to extra big expense in order to get, with the least possible delay, some machines which were needed more than others. Not long ago, because the railroad company could not guarantee fast delivery of a special milling machine to be shipped from Worcester, Mass., vice-president of manufacturing F. F. Beall, chartered a locomotive for the purpose of thus bringing the machine at once to Detroit. A double-end drilling machine was shipped in the same way from Springfield, Mass., a special transmission boring machine, weighing nearly one ton, was shipped by express from Worcester, and shipments of bar steel were made the same way at express rates.

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Kline Co. Acquires Property

RICHMOND, VA., Aug. 9—The Kline Car Corp. has acquired the property of the old Kline Motor Car Corp. for $15,000. The property is situated just outside the city limits and contains 14,167 acres.

All buildings, machinery, franchise rights and the right to use the name "Kline Car" are included in the property transferred.

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Rands Mfg. Co. Adds

DETROIT, MICH., Aug. 9—A two-story addition 153 by 65 is now under construction at the plant of the Rands Mfg. Co. and will nearly double the windshield department. The building will cost about $26,000. An increase in business of at least 50 per cent since the first of the year is reported by this concern, which makes tops and windshields on contract work only. Day and night shifts are at work, the total number of men now on the pay roll being about 650.

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Takes Over Keeton Plant

DETROIT, MICH., Aug. 9.—The Detroit Metal Refining Co., a new corporation, has taken over the old Keeton factory in Detroit and converted it into a modern and up-to-date smelting plant.

Sol Sadek, for years general manager of the Progressive Metal & Refining Co. of Milwaukee, will direct the business of the new company and make his future residence in Detroit. He will, however, retain his interests in the Progressive company.

The Keeton plant has been entirely renovated to accommodate the demands of the new tenant, its two and one-half acres of buildings being fitted with the most modern equipment. This includes forty-eight furnaces, giving an idea of the extent to which the company proposes to operate.

Besides Mr. Sadek, who is widely and favorably known in the metal trades, the officers of the new company are: I. Gerson of Toledo, president; L. R. Grosslight of Detroit, treasurer, and S. Gerson of Toledo, secretary.

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Detroit Battery to Double Plant and Production

DETROIT, MICH., Aug. 9—Indianapolis men and capital are now principally interested in the Detroit Battery Co., which recently increased its capital stock from $10,000 to $60,000. The business of this concern has been growing steadily and now it is planned to double the size of the plant as well as its production. S. W. Elston, who was secretary-treasurer of the Pumpelly Battery Co., Indianapolis, is president and general manager of the company; W. A. Petzold, secretary-treasurer of the J. L. Hudson Co., Detroit, is vice-president; Sol Meyer, banker, Indianapolis, is treasurer, and M. G. Pierson, formerly of the Kelsey Wheel Co., Detroit, is secretary. W. H. Ducharme, treasurer of the Kelsey Wheel Co., is also interested in the concern.

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Rowe Co. Expanding

EAST DOWNINGTOWN, PA., Aug. 7—Samuel J. Rowe, president of the Rowe Motor Mfg. Co. of this city, stated today that his company expected to break ground soon for an addition to its plant. This addition will be necessary to increase the capacity of the plant as the concern has recently received a contract for some foreign business. The extension will be 200 ft. long and 70 ft. wide built of brick.

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Ford-Clark to Furnish Parts

CLEVELAND, OHIO, Aug. 9—The Ford-Clark Co. has equipped a plant at 6536 Carnegie Avenue for supplying jobbers, dealers, garage and repair men with parts formerly difficult to obtain in small quantities for repair and replacement purposes.

The line will consist in part of robe rails, springbolts, foot rails, windshields, inlet and exhaust valves, hood fasteners, spring oilers, drag links and bumpers.

The equipment of the machine shop is especially designed to take care of repair orders for motor valves and grease cup spring bolts, and is in charge of a man who has had extended experience with these parts.

A full line of blanks will be carried, and it is the intention to finish these to any size on short notice.

The officers of the company are: L. J. Ford, formerly with the Steel Products Co., Cleveland, president; A. C. Clark, formerly with the Detroit Seamless Steel Tubes Co., Detroit, vice-president; K. L. Bracken, secretary and treasurer.

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Firestone Employees on Annual Outing

AKRON, OHIO, Aug. 9—Employees of the Firestone Tire & Rubber Co., to the number of 15,000, enjoyed their annual outing at Silver Lake Park on Saturday.

Two of the big thrills of the day were produced by Barney Oldfield racing in his 100 hp. Fiat Cyclone, and De Lloyd Thompson, the aerialist, who exhibited his hair-raising feats of "looping the loop" and flying upside down. A baseball game in the morning between the factory and general office departments resulted in a scrappy contest for the coveted prize of $50 to the winning team.

At noon everybody sat down to dinner, corralled by the time-honored custom of the "family basket" idea. The afternoon was replete with sports of all kinds. There were foot races, novelty races and water sports.

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Cunningham Employees on Outing

ROCHESTER, N. Y., Aug. 7—The employees of the James Cunningham & Son Co., this city, took a holiday to-day, when 400 of them picknicked at Island Cottage.

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Sterling Not to Move

DETROIT, MICH., Aug. 9—The report that the Sterling Motor Co. will move into another plant is denied by officials of that company. The company employs 225 men.

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Buick's July Payroll $530,934

FLINT, BICH., Aug. 7—The Buick Motor Co. paid $530,934 wages to its employees in July, thus setting a new record in its history. Of this total, $293,123 was the pay-roll for the second half of the month.

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J. M. Co. to Represent National Rubber

NEW YORK CITY, Aug. 7—The J. M. Shock Absorber Co. has secured the exclusive sales agency for National tires and tubes in Philadelphia and New York. The J. M. company proposes to make all repairs on National tires free of charge without this added service affecting the list price of the tire or the 5000-mile guarantee.

Factory Miscellany

Sewell Wheel Expands—The Sewell Cushion Wheel Co. is enlarging its plant and it is possible that within the next 12 months an entirely new plant will be started. The company is located at Detroit.

Benford's New Plant—The Benford Mfg. Co., Mount Vernon, N. Y., manufacturer of spark plugs, will build a two-story plant on Pearl Street, west of Fourteenth Avenue, at an estimated cost of $15,000.

Bucyrus Rubber Plant Starts—The Bucyrus Automobile Co. plant has resumed operation following a directors' meeting held recently at which Grant Lambright of Jersey City was secured as superintendent of the plant.

Giant Tire Business Grows—The plant of the Giant Tire Co., Akron, Ohio, is working at full capacity 24 hr. a day in spite of the recent improvements in equipment. Shipments to its branch stores throughout the country are being forwarded as rapidly as its facilities will permit.

Hesse Co. Adds—The Hesse Carriage Co., Kansas City, Mo., in the past few months becoming large manufacturers of automobile bodies, is erecting a two-story building on 50 by 133 adjoining their present quarters, the steel being designed to carry five stories. The addition will cost $25,000.

Millbury Mills Busy—A 190,000-yd. order of mohair automobile cover material has made it necessary for the Millbury Mills, West Millbury, Mass., to start night work. The factory cloth will be shipped to New York City, where it will be put through a waterproofing process. The mill has fifty-eight looms.

Dreadnaught Tire Looking for Site—The Dreadnaught Inner Tube Armor Co., Toledo, Ohio, recently incorporated with a capital of $25,000, has been organized and is looking for a factory site for the manufacture of inner tubes and tires. They claim to have a puncture-proof inner tube, which is protected by patents.

Apperson Makes Addition—Apperson Brothers Automobile Co., Kokomo, Ind., has started an addition to one of its plants. This will give the company an additional 150,000 sq. ft. of floor space, which will be utilized for general manufacturing. The Apperson company completed in July the greatest business for a single month it has ever enjoyed.

Colorado Tire Makes Addition—The Colorado Tire & Leather Co., Denver, Col., is building a two-story addition to its plant that will double the present capacity, making a total of 95,608 sq. ft. of floor space. The 250 employees were given an outing recently at the expense of the company. $100 is offered as a prize for a name for the new tire protectors made by the concern.

Vulcanized Products Expands—The Vulcanized Products Co., which started in business in Muskegon, Mich., several years ago, confining itself to the manufacturing of automobile tire accessories, mechanical molded goods and electrical insulation, will begin manufacturing automobile tires and tubes by Sept. 15, provided its new building is completed on time. About fifty men will then be employed and it is expected that an output of 200 tires and tubes daily will be possible.

Gordon Expands—A Columbus (Ohio) real estate brokerage firm has started the erection of a large addition for the J. P. Gordon Co., located immediately north of the present building on Fourth Street. The general contract for the structure has been awarded and it is to be completed by Nov. 1. The addition will be three stories high with basement, 40 by 90 ft. It is to be occupied as a stock room and office. The J. P. Gordon Co. manufactures a varied line of automobile clothing and accessories.

Canadian Ford Expands—Work on another new addition to the Ford Motor Co.'s plant at Ford, Ont., at an estimated cost of $60,000 has been started. It will extend for 705 ft. along the Detroit River frontage. Hardly had the concrete work on the recently completed $300,000 factory become dry when it was decided to start the present work. The newest building will be one story, of concrete, with a steel saw-tooth roof. It will be devoted entirely to machine-shop work. Although over 150 Ford cars per day are being turned out by this plant—running at capacity—production has not kept pace with orders, and the new machine shop will allow a faster output. To insure solid foundations on the river bank 450 piles are being driven deep, and concrete sunk on top of these.

The Automobile Calendar

Aug. 20-21.....Elgin, Ill., Road Races.
Aug. 26.....Ventura, Cal., Show.
Aug. 30.....Columbus, O., Show, Ohio State Fair, Columbus Auto. Show Co.
Sept.....Peoria, Ill., Second Northwestern Road Congress.
Sept. 4.....Twin City, Minn., 500-Mile Race; Twin City Motor Speedway Co.
Sept. 6-10.....Indianapolis, Ind., Show, Indiana State Fair.
Sept. 6-15.....Detroit, Mich., Show, Michigan State Fair.
Sept. 8-11.....Hamline, Minn., 2-Day Meet at State Fair Grounds between Minneapolis and St. Paul, State Fair.
Sept. 13-17.....Milwaukee, Wis., Show, Automobile Dealers' Assn.
Sept. 13-17.....Oakland, Cal., Pan-American Road Congress.
Sept. 17-18.....Peoria, Ill., Illinois Garage Owners' Assn. Convention.
Sept. 18.....Providence, R. I., 100-Mile Race, Narragansett Park Speedway, Inc.
Sept. 18-25.....Los Angeles, Cal., Show, Shrine Auditorium.
Sept. 20-25.....San Francisco, Cal., International Engineering Congress.
Sept. 24.....Indianapolis, Ind., S. A. E. First Section Meeting.
Sept. 27-Oct. 10...Denver, Col., Show, International Soil Products Exposition, Automobile Trades Assn. of Colorado.
Oct.....Dallas, Tex., Show, Dallas Automobile Dealers' Assn.
Oct.....Los Angeles, Cal., Broadway Automobile and Flower Show, Automobile Dealers' Assn.
Oct. 1-2.....Trenton, N. J., Track Races; Inter-State Fair.
Oct. 2.....New York City, Sheepshead Bay Motor Speedway Track Meet.
Oct. 2.....Fresno, Cal., 150-Mile Race, District Fair, Fresno County Agricultural Assn., C. G. Eberhard.
Oct. 2-9.....Cincinnati, Ohio, Show, Music Hall, Cincinnati Automobile Dealers' Assn.
Oct. 3-10.....St. Louis, Mo., Show, Forest Park Highlands, St. Louis Automobile Manufacturers and Dealers' Assn.
Oct. 4, 5, 6.....Columbus, O., Garage Owners Convention.
Oct. 6-16.....New York City, Ninth Electrical Exposition and Motor Show at Grand Central Palace.
Oct. 9.....Indianapolis, Ind, 100-Mile Invitation Race, Motor Speedway.
Oct. 11-12.....Dayton, O., National Paving Brick Manufacturers' Assn., Annual Meeting.
Oct. 14.....Chicago, S. A. E. Standards Committee Meeting.
Oct. 16.....Chicago, Ill., 350-Mile Race, Chicago Speedway.
Oct. 18-19.....Cleveland, O., Hotel Statler, Sixth Annual Convention, Electric Vehicle Assn. of America.
Nov. 1-3.....Pasadena, Cal., Show, Hotel Green, Walter Hempel.
Nov. 18.....Arizona 150-mile Grand Prix.
Nov. 29-Dec. 4....Electric Prosperity Week.
Dec. 31.....New York City, Show; Grand Central Palace.
Jan. 22, 1916.....Chicago, Ill., Show; Coliseum.
March 4-11.....Boston, Mass., Truck Show, Mechanics Bldg.

The Week in the Industry

Warnsholdt Wichita Ford Manager—H. G. Warnsholdt has been appointed branch manager of the Ford plant in Wichita, Kan.

Hobson King's Pacific Coast Representative.—C. W. Hobson has been appointed Pacific Coast representative for the King Motor Car Co.

Fisher in Terre Haute—Walter Fisher, formerly of the Cadillac agency in Chicago, has become agent for the same car at Terre Haute, Ind.

Tullis Representing English Co.—N. L. Tullis of Vancouver, B. C., has been appointed to look after the interests of the Leyland Motors, Ltd., of Leyland, England.

Dowse Resigns—E. P. Dowse, who has been manager of the Toledo branch of the Goodyear company, has resigned his position to accept a position with another tire company.

Miller Heads Detroit Victor Rubber—Offices have been opened in the Whitney Building, Detroit, by the Victor Rubber Co., Springfield, Ohio. E. H. Miller is local manager.

Hart White's Edmonton Mgr.—M. L. Hart, until recently manager of the White Motor Car Co.'s branch in Edmonton, Alta., has been placed in charge of the Montreal branch.

Glenn Heads Louisville Tire Co.—The Glenn Tire Co. has opened an office at 331 East Broadway, Louisville, Ky. J. P. Glenn is the manager. The concern handles Goodyear truck tires.

Hirsch Chalmers California Representative.—The post of factory representative for the Chalmers Motor Co. in California has been given to J. Hirsch, with headquarters in San Francisco.

Spencer Is Promoted—E. W. Spencer, manager of the sales promotion department of the Studebaker Corp. factory, has been promoted to assistant manager of the Kansas City, Mo., branch.

Cuthbert Chalmers Wholesale Manager—Russ Cuthbert will hereafter have charge of the wholesale end of the L. H. Rose-Chalmers Co. in California, and distribute the Chalmers throughout the State.

Bruske in Maxwell Publicity Department—Paul Hale Bruske, who was manager of the racing team of the Maxwell Motor Co., Detroit, Mich., until this company decided to withdraw from racing, is now a member of the publicity department.

Motor Men in New Roles

Bement Succeeds Pardington—A. F. Bement, who was director of publicity of the Lincoln Highway Association, has been chosen to succeed the late A. R. Pardington, who was vice-president and secretary.

Reed with Donovan—M. N. Reed, formerly associated with Frank B. Donovan in Boston, has taken charge of the sales for Frank B. Donovan (Incorporated), the new Studebaker distributor in Baltimore, Md.

Stubbs Joins Northwest Motors—P. D. Stubbs, formerly western manager for the Hudson Motor Car Co., has become permanently connected with the Northwest Motors Co., Seattle, Hudson and Packard distributor.

Spalding Milburn Electric District Manager—Will Spalding, the Milburn & Walker electric representative with headquarters in Portland, Ore., has been appointed district manager for the Milburn interests for Oregon, Washington, Idaho and British Columbia.

Price Coming East—Frank Price of the Swan Carbureter Co. is on his way from San Francisco to Detroit. He will follow the route of the Lincoln Highway, placing agencies and service stations along the way. The company has a service station in Santa Barbara, Cal.

Branstetter Heads Kissel Retail—H. P. Branstetter, Wabash Avenue and Twenty-sixth Street, Chicago, who has handled the wholesale business for the Kissel Motor Car Co., covering Illinois and Indiana territory, has been given charge of the retail Kissel business in Chicago in addition.

Reeser Willard Assistant Manager—E. B. Reeser has been appointed assistant district manager of the Detroit, Mich., offices of the Willard Storage Battery Co. Mr. Reeser was at one time manager of the Chicago branch of the Kellog Mfg. Co., and more recently was traveling for the Willard company.

Earl C. Anthony Makes Changes—Earl C. Anthony, Inc., announces the following changes in Reo distributing force in California: F. A. Norberg has been placed in charge of the Reo truck department in San Francisco. W. M. Broodie will hereafter act as traveling representative for the Reo in California. L. F. Reed has been appointed resident manager of the company in Fresno, Cal.

Foster Makes Change—Newton Foster, formerly of Boston, has purchased an interest in the NePage, McKenny Automobile Co., with headquarters in Seattle, and hereafter this company will be known as the Newton Foster Co., and will act as distributor in Western Washington for the Paige and National lines. The salesrooms and mechanical plant are located at 1512-1522 Eighth Avenue.

Pennell Heads Fort Wayne Ford—The new Ford agency has been established in Fort Wayne, Ind. The branch is now in charge of J. C. Pennell, for five years connected with the Detroit branch. J. C. Smith, in charge of the Indianapolis branch, is assisting in establishing the new agency. Brosius & Brosius, who for several years had the Ford branch in Fort Wayne, will continue in the automobile business at their place on East Main Street.

La Casse Maxwell Branch Manager—W. J. La Casse, prominent figure in the automobile industry in Portland, Ore., will hereafter act as branch manager for the Maxwell interests for the Northwest. The headquarters will house $100,000 worth of parts and the Portland branch will carry cars for both Oregon and Washington agencies and possibly Utah. La Casse came to Portland direct from Fresno, Cal., where he was district manager for the Maxwell last year.

Change in Stutz Agency—Sales Manager H. W. Anderson of the Stutz factory, went to Boston, Mass., last week and shifted the Stutz agency there to a new company headed by Edward Becker, who was a partner of Messrs. Freeman and Chace, who have handled it for some years. He has leased headquarters at 911 Boylston Street, a few doors west of the old salesrooms. The new company has a wholesale distribution for Maine, New Hampshire, Vermont and Massachusetts.

Vogt Interested in Pullman Agency—H. F. Vogt, treasurer of the American Automobile Co., 187 Wisconsin Street, Milwaukee, state agent for the Pierce-Arrow, is a principal in the incorporation of the Pullman Automobile Co. of Milwaukee, which will handle the Pullman in southern and eastern Wisconsin and the counties of Stephenson and Winnebago in Illinois. Offices and showrooms are being established at 134-136 Oneida Street. The Pullman has not been represented in Milwaukee for several years. R. C. Wrege and A. H. Barnickel are associated with Mr. Vogt in the new agency.